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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 1824

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 1825

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications.*

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1827

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

06 AIRCRAFT INSTRUMENTATION 1829

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

07 AIRCRAFT PROPULSION AND POWER 1830

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

08 AIRCRAFT STABILITY AND CONTROL 1831

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 1834

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 1834

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13 ASTRODYNAMICS 1838

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

15 LAUNCH VEHICLES AND SPACE VEHICLES 1838

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 1842

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING 1845

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 1846

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

19 SPACECRAFT INSTRUMENTATION N.A.

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

20 SPACECRAFT PROPULSION AND POWER 1847

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 1847
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 1848
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 1850
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS 1857
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 1863
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 1866
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

31 ENGINEERING (GENERAL) 1870
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 1872
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING 1875
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER 1880
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY 1884
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS 1886
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 1887
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 1890
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 1891
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) 1896

43 EARTH RESOURCES 1902
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION 1909
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

45 ENVIRONMENT POLLUTION 1925
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 1928
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY 1933
Includes weather forecasting and modification.

48 OCEANOGRAPHY 1937
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **1939**
Includes genetics.

52 AEROSPACE MEDICINE **1945**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **1947**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **1947**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **1948**

60 COMPUTER OPERATIONS AND HARDWARE **1950**
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE **1952**
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS **1957**
Includes computer networks.

63 CYBERNETICS **1957**
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS **1959**
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **1963**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **N.A.**
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **N.A.**
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering.*

70 PHYSICS (GENERAL) **1963**
For geophysics see *46 Geophysics.* For astrophysics see *90 Astrophysics.* For solar physics see *92 Solar Physics.*

71 ACOUSTICS **1964**
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS **1966**
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS **1968**
Includes elementary and nuclear particles; and reactor theory.
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74 OPTICS **1969**
Includes light phenomena.

75 PLASMA PHYSICS **1970**
Includes magnetohydrodynamics and plasma fusion.
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76 SOLID-STATE PHYSICS **1972**
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS **1975**
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **1975**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **1976**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **N.A.**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **1977**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
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Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **1983**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **1984**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **1985**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **1985**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **1985**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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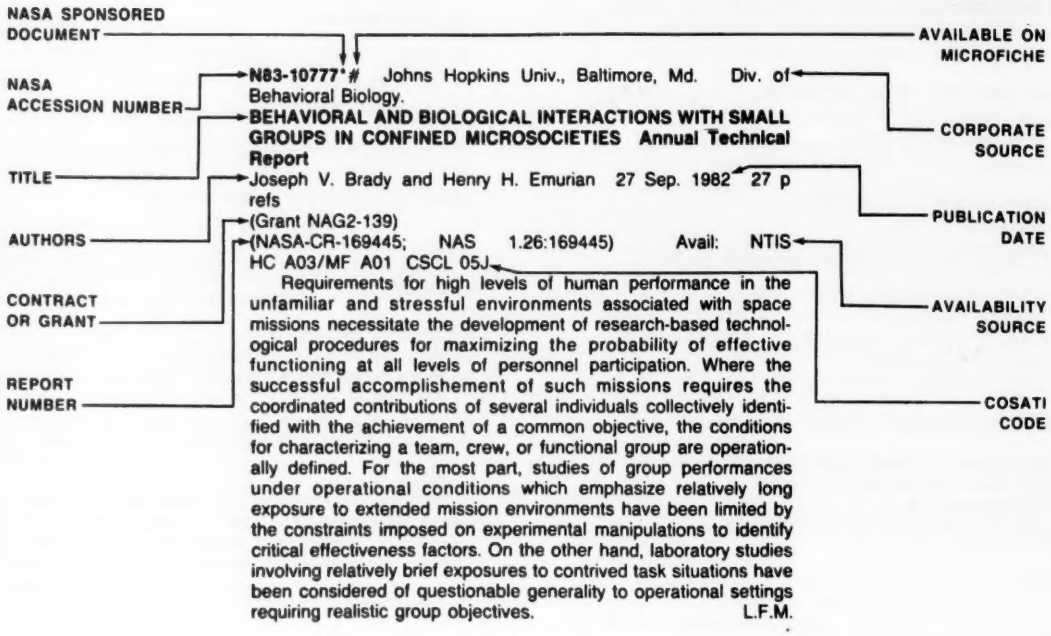
TYPICAL CITATION AND ABSTRACT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NASA ACCESSION NUMBER
N83-10777*# Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
CORPORATE SOURCE
TITLE
BEHAVIORAL AND BIOLOGICAL INTERACTIONS WITH SMALL GROUPS IN CONFINED MICROSOCIETIES Annual Technical Report
AUTHORS
Joseph V. Brady and Henry H. Emurian 27 Sep. 1982 27 p refs
PUBLICATION DATE
CONTRACT OR GRANT
(Grant NAG2-139)
REPORT NUMBER
(NASA-CR-169445; NAS 1.26:169445) Avail: NTIS
AVAILABILITY SOURCE
HC A03/MF A01 CSCL 05J
COSATI CODE
Requirements for high levels of human performance in the unfamiliar and stressful environments associated with space missions necessitate the development of research-based technological procedures for maximizing the probability of effective functioning at all levels of personnel participation. Where the successful accomplishement of such missions requires the coordinated contributions of several individuals collectively identified with the achievement of a common objective, the conditions for characterizing a team, crew, or functional group are operationally defined. For the most part, studies of group performances under operational conditions which emphasize relatively long exposure to extended mission environments have been limited by the constraints imposed on experimental manipulations to identify critical effectiveness factors. On the other hand, laboratory studies involving relatively brief exposures to contrived task situations have been considered of questionable generality to operational settings requiring realistic group objectives. L.F.M.

VOLUME 21 NUMBER 12/JUNE 23, 1983

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N83-22090* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 159)
Mar. 1983 98 p
(NASA-SP-7037(159); NAS 1.21:7037(159)) Avail: NTIS HC $5.00 CSCL 01A

This bibliography lists 347 reports, articles and other documents introduced into the NASA scientific and technical information system in February 1983. Author

N83-22091*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION OF A WEATHER RADAR DISPLAY FOR OVER-WATER AIRBORNE RADAR APPROACHES
George R. Clary Feb. 1983 29 p refs
(NASA-TM-84315; A-9185; NAS 1.15:84315) Avail: NTIS HC A03/MF A01 CSCL 17I

Airborne radar approach (ARA) concepts are being investigated as a part of NASA's Rotorcraft All-Weather Operations Research Program on advanced guidance and navigation methods. This research is being conducted using both piloted simulations and flight test evaluations. For the piloted simulations, a mathematical model of the airborne radar was developed for over-water ARAs to offshore platforms. This simulated flight scenario requires radar simulation of point targets, such as oil rigs and ships, distributed sea clutter, and transponder beacon replies. Radar theory, weather radar characteristics, and empirical data derived from in-flight radar photographs are combined to model a civil weather/mapping radar typical of those used in offshore rotorcraft operations. The resulting radar simulation is realistic and provides the needed simulation capability for ongoing ARA research. Author

N83-22092*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEW TEST TECHNIQUES AND ANALYTICAL PROCEDURES FOR UNDERSTANDING THE BEHAVIOR OF ADVANCED PROPELLERS
George L. Stefko, Lawrence J. Bober, and Harvey E. Neumann 1983 24 p refs Presented at the 1983 Business Aircraft Meeting and Exposition, Wichita, Kans., 12-15 Apr. 1983; sponsored by the Society of Automotive Engineers
(NASA-TM-83360; E-1622; NAS 1.15:83360; SAE-830729) Avail: NTIS HC A02/MF A01 CSCL 01B

Analytical procedures and experimental techniques were developed to improve the capability to design advanced high speed propellers. Some results from the propeller lifting line and lifting surface aerodynamic analysis codes are compared with propeller force data, probe data and laser velocimeter data. In general, the code comparisons with data indicate good qualitative agreement. A rotating propeller force balance demonstrated good accuracy and reduced test time by 50 percent. Results from three propeller flow visualization techniques are shown which illustrate some of the physical phenomena occurring on these propellers. S.L.

N83-22093# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
ADVANCES IN GUIDANCE AND CONTROL SYSTEMS
Jan. 1983 240 p refs In ENGLISH and FRENCH Symp. held in Lisbon, 12-14 Oct. 1982
(AGARD-CP-321; ISBN-92-835-0324-4) Avail: NTIS HC A11/MF A01

Advances in optimal control theory, synthesis techniques and design methodology applicable to aircraft control are discussed. The rapidly developing technologies in computation, data distribution systems, computer aided design methods and data bases which permit application of theories and synthesis methods heretofore impractical are discussed. Aspects of these emerging technologies ranging from theory through applications including aircraft, missiles, space vehicles and unmanned vehicles are discussed. Automatic flight control, airborne/spaceborne computers, and air navigation are emphasized. For individual titles, see N83-22094 through N83-22111.

N83-22094# Systems Technology, Inc., Hawthorne, Calif.
PROGRESS AND PITFALLS IN ADVANCED FLIGHT CONTROL SYSTEMS c08
Duane McRuer *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 17 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

Unfavorable side effects of the conjunction of multiple-fail-operational fly-by-wire flight control and high-performance new aircraft technology are discussed. Greater flight control system (FCS) complexity and cost are obvious disadvantages but other unfavorable effects are more subtle. The first is associated with the flight control and flying qualities of unstable relaxed static stability aircraft. In solving the control problem an equivalent vehicle is created in which the key dynamic properties comprise a mix of FCS and airframe parameters. Unfortunately, the equivalent vehicle dynamics may no longer correspond to those of conventional aircraft. Instead, they are different in kind as well as degree. There are very few flying quality data that are appropriate for such systems and, not surprisingly, existing criteria are difficult or impossible to apply directly. Such data as do exist are summarized and implications for possible criteria developed. The second issue is the accumulation of lags and delays resulting when stick and flexible mode suppression filters, high-frequency actuation dynamics, and computational delays, are combined. These give rise to a net effective time lag or delay in the vehicle dynamics as seen by the pilot which, if excessive, can cause serious piloting problems. The third example focuses on some of the peculiarities associated with sampled, as contrasted with continuous, control. R.J.F.

N83-22095# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
DESIGNING IMPROVED TRACKING REGULATORS FOR PI-

LOTING HIGHLY MANEUVERABLE AIRCRAFT [REALISATION DE REGULATEURS DE POURSOUTE AMELIORES POUR LE PILOTAGE DES AVIONS A GRANDE MASOEUVRABILITE] **c08**

Omer L. Mercier *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 13 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

The multivariable control of an highly maneuvering aircraft in an extended flight envelope is receiving a growing attention in recent years. From the control designer point of view, it bears close relationship to the servomechanism problem in the sense that a vector of output variables is regulated to track continuously set command variables. This tracking problem is further complicated by the fact that, in the range of considered maneuvers, the dynamic model is highly nonlinear, variable about the flight domain, and prone to severe modeling errors and variations. Yet, piloting objectives must be met while satisfying handling qualities specifications. In addition, tracking must be maintained under continuously acting external disturbances and low-frequency turbulence must be rejected. Important defects of classical methods are shown and an improved theory is presented and applied to the fighter control problem. Tolerance of model mismatch and nonlinearities is especially demonstrated in numerical simulations. Author

N83-22096# Salford Univ. (England). Dept. of Aeronautical and Mechanical Engineering.
MICROPROCESSOR IMPLEMENTATION OF FAST-SAMPLING DIRECT DIGITAL FLIGHT-MODE CONTROLLERS **c08**

B. Porter, A. Bradshaw, A. Garis, and M. A. Woodhead *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 8 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

Some general results are extended to allow for a computational time-delay of up to one sampling period by a simple modification of the control algorithms. The resulting control algorithms are simple to implement and provide tight non-interacting control. Their efficiency and effectiveness are demonstrated by the presentation of the results of a laboratory microprocessor implementation in which the controllers are required to effect fuselage pitch pointing and vertical translation maneuvers in the case of an analogue computer representation of the YF-16 aircraft. R.J.F.

N83-22097# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.
SYSTEMATIC COMPUTER AIDED CONTROL DESIGN **c08**

Georg Gruebel and Gerhard Kreisselmeier *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 7 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

Computerized synthesis techniques of modern control theory are in widespread use, but a number of fundamental design problems still remain. They are the design specfications problem, the free design parameter problem, the plant complexity versus controller simplicity problem, and the dirty design environment problem. A design procedure which comes close to solving these design problems is recommended: it is an iterative design technique using a performance index vector which provides a systematic guidance for the designer to take care of multiple design objectives simultaneously and individually. As a design tool unconstrained parameter optimization is used. A practical application is briefly reported: The design of a robust control loop for a fighter aircraft where 42 performance criteria of 9 different sorts have been considered simultaneously. R.J.F.

N83-22098# Rome Univ. (Italy). School of Aerospace Engineering.
DIGITAL IMPLEMENTATION OF A LASER ACTIVE FLIGHT CONTROL SYSTEM WITH PROCESSED DECOUPLED STATES **c08**

Achille Danesi *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

The results of the state variable decoupling theory are applied to decouple the roll and yaw lateral motion as required to satisfy independently maneuvering and trajectory following specifications. The rudder channel gains, yielding the decoupling process and forcing the vehicle transient behaviour to reproduce the desired response, are computed and the resulting multi-input-multi-output autopilot feedback structure is described. The software aspects of the digital autopilot, including the laser package and microprocessors resolving the control laws, are presented and the system simulation results are shown for the evaluation of the system dynamical behaviour in response to a wind shear perturbation. R.J.F.

N83-22099# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Lehrstuhl fuer Regeltechnik und Electronik.
IMAGE SUPPORTED NAVIGATION IN LOW ALTITUDES BASED ON THE DETECTION OF ROADS AND RIVERS **c04**

Rolf-Dieter Therburg *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 7 p (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

If a flight navigation system has to operate independently of ground stations or satellites, it has to be updated by acquisition of ground data. Position-fixing by automated detection of rivers, roads, and other traffic routes in the visual image underneath the aircraft is discussed. These patterns, undistorted even if viewed from low altitudes, are detected by an electrooptical sensor, which correlates the image with a rotating slit. As this sampling pattern is matched to line-shaped image patterns, traffic routes are detected in highly structured background in spite of weak contrast. For position fixing data of detected traffic routes are fed to a micro computer on board, to be compared with stored map data of traffic routes. This approach forced the development of a suitable nonlinear filtering method, yielding an optimal estimation of the real position and thereby the position offset of a dead reckoning system. R.J.F.

N83-22100# RCA Government Systems Div., Cherry Hill, N.J.
DESIGN AND SIMULATION OF AN INTELLIGENT MISSILE SEEKER **c15**

J. Hayman *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 15 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

An intelligent tracking algorithm for an IR imaging missile seeker and a method of evaluating its performance in simulated flight is described. The missile is a fire-and-forget, shoulder-launched, anti-tank weapon that lofts to an altitude of approximately 150 meters and then homes toward the target using proportional guidance. A gyro stabilized seeker is precessed to the target by pointing commands. These pointing commands are developed from an imaging sensor by a new tracking algorithm that performs well in a highly cluttered background. Both the tracking algorithm design and its evaluation in missile flights were accomplished using a digital computer simulation called HUGGER. This program includes a 6 degree-of-freedom missile simulation, a detailed seeker model, a three-dimensional model of the target, a two-dimensional background model, and the intelligent tracking algorithm. Sensor images of the target as seen from the missile are formed on a 64 x 128 pixel infrared charge coupled device array. The algorithm utilizes three features within the image: intensity, spatial frequency, and internal gradients. A multithresholding technique is also described which enhances target discrimination. R.J.F.

N83-22101# Crouzet Aerospace and Systems, Valence (France).
ANEMOBAROMETRIC SYSTEMS FOR NEXT GENERATION AIRCRAFT [SYSTEMES ANEMOBAROMETRIQUES POUR AVIONS DE LA PROCHAINE GENERATION] **c08**

J. Mandle *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 9 p refs In FRENCH (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

Major principles and significant results are presented for a general study of the vehicles for anemometry and barometry of the next generation aircraft. The evolution of equipment in the past is reviewed and recent trends are presented which represent two different concepts - integrated systems and specific systems. A survey conducted in 1980 among numerous organizations in France as well as in the United States shows that the second solution has more supporters. Transl. by A.R.H.

N83-22102# Smiths Industries Ltd., Bishops Cleeve (England). Aerospace and Defence Systems Div.

THE USE OF MULTIPLEX DATA BUSES IN A HIGH INTEGRITY SYSTEM c05

P. Crouch and A. G. Seabridge (British Aerospace Aircraft Group) *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

The utility systems of an aircraft were analyzed and shown to benefit considerably from integration into a connected system with shared processing resources. The MIL-STD-15538 data bus was selected as the most cost effective tool for integration, but raises problems connected with ensuring the safety of the aircraft. Careful design of the data bus components and controllers with particular attention being paid to built-in-test techniques and in the functional segregation of the interfaces, subsystems and computing facilities has allowed a sufficiently reliable system to be designed and this is now entering full scale development. R.J.F.

N83-22103# Singer-Kearfott, Wayne, N. J.

ADVANCED DESIGN AND PERFORMANCE OPTIMIZATION TECHNIQUES UTILIZED TO DEVELOP THE F-111 WEAPONS/NAVIGATION COMPUTER (WNC) c05

Albert J. Shapiro *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

A new weapons navigation computer (WNC)(AN/AYK-18) to provide the F-111 with an upgraded central computer to serve through the 1990's is discussed. The goals for this computer were increased computational capability, increased reliability, operability with existing (CP-2/CP-2 EX) and future (MIL-STD-1750) Instruction Set Architectures (ISA's), and form, fit and function compatibility with its AN/AK-6 predecessor. By the systematic application of design, performance and cost trade-offs, all essential goals were achieved. Computational capability improvement was achieved by using a 32-bit Central Processor Unit (CPU), memory and local bus and a 16-bit bus and architecture for the remainder of the computer. Reliability was improved by employing Kearfott's hollow card cooling concept and thereby keeping all components well below their critical temperatures. The ISA's for both AN/AYK-6 and AN/AYK-18 were embedded in microcode and selectable by software. The resultant WNC has an affordable production cost, can emulate the required ISA's, has a predicted reliability of over 3000 hours, a throughput of 462 KOPS, Built-In Test (BIT) to the card level and is interchangeable with the AN/AYK-6. R.J.F.

N83-22104# Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.

A MODULAR APPROACH TO HIGH RELIABILITY SOFTWARE GENERATION WITH APPLICATION TO NONLINEAR CONTROL c61

S. M. Wright and J. S. Winter *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

This paper describes an interlocking set of techniques covering control law and control system architecture design, documentation and validation. These address the problems experienced by the airframe manufacturer in proving the integrity of a digital control system (hardware and software) in such a way that the undoubted power and flexibility of digital techniques can be fully exploited. An idealized processor architecture and instruction set is presented and its application illustrated by reference to a set of nonlinear control laws. This shows how the control law coding and verification can be eliminated as a separate step in the design process. Finally the beneficial effect of the control law structure on the process of failure identification and subsequent failure management is described. Author

N83-22105# Calspan Advanced Technology Center, Buffalo, N.Y.

FLIGHT CONTROL SYSTEM DESIGN USING ROBUST OUTPUT OBSERVERS c08

E. G. Rynaski *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 8 p refs (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

An investigation was made of the application of robust output observer theory to the design of flight control systems for advanced aircraft configurations. Observer theory constitutes a natural design tool because the resulting observers are in themselves unobservable and do not increase the order of the closed-loop response, thereby more closely satisfying flying qualities requirements. Examples are presented to show that the observer configuration is not unique in either the observer poles or the output sensors, and many different control system configurations using a variety of sensors can be designed to yield identical closed-loop dynamic behavior. In this way, considerable analytic and physical redundancy can be incorporated into nearly any flight control system. Author

N83-22106# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Dynamics Div.

ON VALIDATION OF MISSION-SOFTWARE BY CLOSED-LOOP TESTING IN REALTIME c61

Hermann Neubauer *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 15 p (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

This contribution is intended to provide both some basic considerations on validation techniques for simulations and their application to a real-time digital computer simulation with hardware-in-the-loop (HWIL). Author

N83-22107# Dowty Electronics Ltd., London (England).

BUILDING IN INTEGRITY TO A HIGHER ORDER LANGUAGE c61

N. J. B. Young *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 10 p refs (For primary document see N83-22093 12-01)

Avail: NTIS HC A11/MF A01

Despite potential advantages the use of High Order Languages (HOL's) in high integrity systems remains inadvisable. HOL compilers are complex and difficult to validate and even when correct may produce unexpected results. Methods are discussed for simplifying HOL's so that high visibility is maintained from HOL code through the process of translation down to machine code level. These methods can be applied to standard HOL's or a new HOL can be designed around them. The methods are particularly useful in embedded systems (such as engine controllers) of low cost relative to the facility to which they are applied and which require considerable modification during trials or in serivce. Author

N83-22108# Northrop Corp., Hawthorne, Calif. Flight Control Research Dept.

DEVELOPMENT AND APPLICATION OF DIGITAL CONTROL FOR TACTICAL AIRCRAFT FLUTTER SUPPRESSION c08

Dinesh S. Joshi, Don F. Kesler, and Erwin H. Johnson *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p refs (For primary document see N83-22093 12-01)

(Contract F33615-80-C-3217)

Avail: NTIS HC A11/MF A01

Active control methods have been applied to synthesize and mechanize digital control laws for tactical aircraft futter suppression. Several methods to digitize analog control laws have been compared. The State Space Method with Jordan Canonical Transformation offers a systematic and efficient digital flutter control design for multivariable systems. A transonic wind tunnel test

conducted under a U.S. Air Force contract conclusively demonstrated the feasibility of digital implementation. Author

N83-22109*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA/RAE COLLABORATION ON NONLINEAR CONTROL USING THE F-8C DIGITAL FLY-BY-WIRE AIRCRAFT c08
G. F. Butler, M. J. Corbin, S. Mepham, J. F. Stewart, and R. R. Larson *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 17 p refs Prepared in cooperation with RAE, Farnsborough (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01 CSCL 01C

A cooperative advanced digital research experiment (CADRE) was established by the National Aeronautics and Space Administration (NASA) and the Royal Aircraft Establishment (RAE), in which nonlinear control algorithms developed by the RAE were tested on the F-8C digital fly-by-wire (DFBW) aircraft based at the Dryden Flight Research Facility. In the initial phase of the collaboration, some variable-gain algorithms, referred to collectively as variable integral control to optimize response (VICTOR) algorithms, were fight tested. With VICTOR, various measures available within the control system are used to vary gains and time-constants within the closed loop and thereby enhance the control capability of the system, while reducing the adverse effects of sensor noise on the control surfaces. A review of design procedures for VICTOR and results of preliminary flight tests are presented. the F-8C aircraft is operated in the remotely augmented vehicle (RAV) mode, with the control laws implemented as FORTRAN programs on a ground-based computer. Pilot commands and sensor information are telemetered to the ground, where the data are processed to form surface commands which are then telemetered to the ground, where the data are processed to form surface commands which are then telemetered back to the aircraft. The RAV mode represents a single-string (simplex) system and is therefore vulnerable to a hardover since comparison monitoring is not possible. Hence, extensive error checking is conducted on both the ground and airborne computers to prevent the development of potentially hazardous situations. Experience with the RAV monitoring and validation procedures is described. Author

N83-22110# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Aircraft Div.
FLIGHT TEST EXPERIENCE WITH A DIGITAL INTEGRATED GUIDANCE AND CONTROL SYSTEM IN A CCV FIGHTER AIRCRAFT c08
U. Korte *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

A quad redundant digital FBW Control System for a highly unstable fighter aircraft has been developed and flight tested by MBB in a single seater F-104 G which had been modified as a CCV demonstrator. The CCV program was funded by the German MOD. From Dec. 1977 to Nov. 1981 a total of 118 flights has been conducted. During these flights the quadruplex system was successfully tested for five different configurations starting with the highly stable basic aircraft and ending up with the highly unstable canard configuration with a static instability up to 22% mean aerodynamic chord (MAC). Some of the results obtained regarding control system design, handling evaluation and redundancy management with the digital system will be presented. Author

N83-22111# Marconi Avionics Ltd., Rochester (England). Combat Aircraft Controls Div.
GROUND AND FLIGHT TESTING ON THE FLY-BY-WIRE JAGUAR EQUIPPED WITH A FULL TIME QUADRUPLEX DIGITAL INTEGRATED FLIGHT CONTROL SYSTEM c08
T. D. Smith, C. J. Yeo, and R. E. W. Marshall *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 20 p refs Sponsored in part by British Aerospace Aircraft Group, Preston, England (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

A national (U.K.) research programme has been undertaken with the aim of the design, development and demonstration of a safe, practical full time fly-by-wire flight control system for a combat aircraft. Throughout the program, the flight control system was to be treated in all airworthiness aspects as though it were intended for production. The flight trials were to include flight assessment of an integral spin prevention system and aircraft configurations which are unstable in pitch. The first major objective of the program has been achieved, namely the generation of confidence in the airworthiness of such a system, by the successful completion of the design, development, ground testing and initial flight test assessment of a fully representative system. Author

N83-22112# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SOFTWARE FOR AVIONICS
Jan. 1983 450 p refs In ENGLISH and FRENCH Conf. held in the Hague-Kijkduin, Netherlands, 6-10 Sep. 1982
(AGARD-CP-330; ISBN-92-835-03332-6) Avail: NTIS HC A19/MF A01

The predominant impacts of computer software in avionics are addressed including the following areas: software design, analysis techniques, improvement of structure and design, military standards, verification, and validation. For individual titles, see N83-22113 through N83-22152.

N83-22113# General Dynamics Corp., Fort Worth, Tex.
AVIONIC SOFTWARE DESIGN c06
David E. Sundstrom *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Time, theory, and applications experience have lead us to an understanding of a very specific software product, the avionics operational flight program. The knowledge we now have permits us to identify a common software structure and design methodology. The structure reflects the characteristics of the avionics environment, and is applicable to mission processors, stores management processors, integrated cockpit control processors, and possibly others. We identified a number of characteristics of the avionics environment and related these characteristics to design requirements for a common software operating structure. The adoption of this structure supports a design methodology which has many desirble features, beginning with common naming conventions, an emphasis on data flow specification, and clearly identified design responsibilities. A discussion of the structure and the design methodology are provided. This structure and methodology was demonstrated in production of F-16 airplanes and is currently the development basis for multiple software programs in advanced F-16 versions. It represents a mature and transferable technology. Author

N83-22114# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmnsbereich.
SOFTWARE DEVELOPMENT: DESIGN AND REALITY c61
H. vonGroote and F. Schwegler *In* AGARD Software for Avionics Jan. 1983 10 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Experiences gained during the development of the Operational Flight Program of the MRCA Tornado were described. A short outline of the organisational structure and of the Avionic System is given, followed by the description of the different design and test stages. Then some general reasons are presented which caused major changes to the software specifications and which are believed to be true for any development of a new avionic system. A description of the purging process of the assembler program was discussed. Author

N83-22115# British Aerospace Dynamics Group, Stevenage (England).
MASCOT DEVELOPMENTS TO IMPROVE SOFTWARE STRUCTURE AND INTEGRITY c61
H. R. Simpson *In* AGARD Software for Avionics Jan. 1983

14 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The principal features of the Modular Approach to Software Construction Operation and Test (MASCOT) approach to design are described and some possible developments to give improved software structure and integrity are proposed. These developments are concerned with three areas of the MASCOT approach: subsystem structure, process synchronization, and data access control. The proposed developments are entirely consistent with existing MASCOT concepts and, with little difficulty, can be incorporated into the system building, run time executive and dynamic monitoring software. It is a powerful feature of MASCOT that the supporting software which underpins the method (sometimes called the MASCOT machine) is not excessively complex and so can be reasonably easily implemented and readily understood. The proposed developments preserve this feature. B.G.

N83-22116# Electronique Serge Dassault, St. Cloud (France).
TOWARDS A VERITABLE SUPERVISOR PROGRAM FOR AVIONICS SOFTWARE [VERS UN VERITABLE ATELIER DE LOGICIEL AVIONIQUE] c06
G. Bracon *In* AGARD Software for Avionics Jan. 1983 14 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Experience acquired in the development of equipment and avionics software for the Mirage FI and the Mirage 2000, led to the definition of a software overseer. The AIGLE supervisor program is oriented toward considering methodologies and assists in developing, maintaining, and following the project. It involves a group of complementary operational tools which use a central data base and can then divide the information. The integration of official service and the comfort of man machine dialog permits improved productivity. The essential characteristics of AIGLE is the automatic knowledge of quality control information and of project management. This permits validation of production processes, an indispensable element in software certification.
Transl. by A.R.H.

N83-22117# Marconi Avionics Ltd., Boreham Wood (England).
REQUIREMENTS DECOMPOSITION AND OTHER MYTHS c61
T. G. Swann *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A myth is a traditional fiction that reveals a greater truth. Procurement of large, innovative, systems is discussed - why do we never get what we want? The problems are often blamed on certain types of faults in the requirement specification and the design process. Requirements specification are discussed and it is seen that they are far more complex than we are asked to believe. It is argued that the description of design as Requirements Decomposition is more than a simplification: it is positively misleading. Similary the virtues of good specifications, such as completeness and formality, are not just prerequisites for success: they are unattainable ideals. It is concluded that many traditional maxims, though valuable, should not be taken too literally. They are, perhaps myths. Author

N83-22118# British Aerospace Aircraft Group, Warton (England).
PRACTICAL CONSIDERATIONS IN THE INTRODUCTION OF REQUIREMENTS ANALYSIS TECHNIQUE c61
C. P. Price and D. Y. Forsyth *In* AGARD Software for Avionics Jan. 1983 12 p ref Sponsored in part by RAE (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A wider use of requirements analysis techniques in the development of avionic systems is probable. They may be employed in the production of software requirements in particular or the development of higher level system requirements. Such approaches are said to consist of a methodology used in the production process, software tools to assist in analysis, and the existence of a specific target software design interface such as language and architecture. The predicted quality and productivity improvements will only be attained if the election of tools and techniques is tempered by practical considerations. The main issues any organization contemplating the use of requirements analysis techniques will have to consider are discussed. They include the scope of application, system or software, the special needs of users, attributes of the methodology, the level of automation and the means by which they can be introduced to a project. Semi-Automated Functional Requirements Analysis (SAFRA) is briefly described. In SAFRA, Controlled Requirements Expression (CORE) is the method of production embracing data collection, system analysis and notation. Storage and validation of the description is achieved using the Problems Statement Language and Problem Statement Analyser (PSL/PSA) including a system description language, database management system and a suite of apropriate reports. B.G.

N83-22119# Electronique Serge Dassault, St. Cloud (France).
D.L.A.O.: A SUPPORT SYSTEM FOR DEFINING AVIONICS SOFTWARE [D.L.A.O.: UN SYSTEME D'AIDE] c06
Sylvie Chenut-Martin and Francois Doladille *In* AGARD Software for Avionics Jan. 1983 11 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Major principles are described for a system for the computer aided design of software. This support system helps elaborate the specifications of real time software, particularly avionics programs. The steps followed in analyzing definition processes applied for onboard computers, as well as in analyzing user needs and existing systems are considered. The discreet solutions obtained are then developed with particular stress on simplicity of use and ease in constructing documents. The system should be integrated in a coherent ensemble of tools covering the different stages of the life cycle of the software. The problems posed by integration with a system for computer aided design are raised.
Transl. by A.R.H.

N83-22120# Marconi Avionics Ltd., Boreham Wood (England).
THE MENTOR APPROACH TO REQUIREMENTS SPECIFICATION
D. Jordan and B. Hauxwell *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-61)
Avail: NTIS HC A19/MF A01

Requirements specification methodologies and documentation systems which are available adopt a range of differing viewpoints on the system development problem. Each is oriented to enabling the user to specify efficiency some particular aspect of the target system, and each places a particular emphasis on certain features. The role of an automated documentation system should be to accommodate all information relevant to a system design, to check rigorously that information for consistency, and to make it visible in a range of reports which individually provide various emphasis on the information. Development of a integrated system mentor, is intended to assist in the gathering of information, definition of terms, and development of designs for avionics systems. The system has the following major features: a new specification method which guides the user in the decomposition of his problem by partitioning the behaviour of the target system among a number of operational capabilities; a specification language NATTER (A NATural TERminology) is intended for use by any personnel involved in the system development and is sufficiently flexible to accommodate all functional documentation for the target system; and an advanced algebraic analysis technique which enables the system to perform a powerful dynamic consistency analysis of the evolving specification, and provide valuable feedback to the development teams. B.G.

N83-22121# Mathematischer Beratungs- und Programmierungsdienst G.m.b.H. Dortmund (West Germany).
THE COMPUTER AIDED SPECIFICATION SYSTEM EASY c61
Lutz Hirschmann and Niels Christensen *In* AGARD Software for Avionics Jan. 1983 12 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Easy is a formalism which support the description of the

specification in a simple semiformal manner and emphasises the use of data types. It is our view, that a specification should not only be precise, unambigious and complete, but is also a document which serves for the communication between people (software engineers). The term specification is used to describe the result of the system design phase i.e. for the description of the decomposition of the system into modules and the interaction between these modules. A specification written in Easy consists of packages which provide the encapsulation of logically related information, data and functions. Packages communicate by interfaces which consist of procedures, types and constants. Objects of the export-interface are resources implemented in the exporting package and are made available to other packages. Objects used from other packages are listed in the import-interface. Restrictions in the use of exported procedures must be mentioned in the description of the procedure or (preferably) in the paragraphs 'sequence' and 'error'. A software tool - Easy Tool - was developed to support the use of Easy. It checks specifictions for syntactical and semantical correctness, consistency and completeness, supports the editing, stores and maintains specifications in a data base and generates several crossreference lists. Future versions of the tool will support the transition from specification to implementation to make sure the program matches the specification. B.G.

N83-22122# General Dynamics Corp., Fort Worth, Tex.
THE IMPACT OF STANDARDIZATION ON AVIONIC SOFTWARE **c61**
J. D. Engelland *In* AGARD Software for Avionics Jan. 1983 6 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

This era of avionic software gave rise to a number of serious problems. Several of the software standards being promulgated today are legacies of the problems encountered with these early digital systems. However, in spite of all problems the digital systems were clearly demonstrated to be better and more capable and the movement to digital systems accelerated. With the advent of the microprocessor, it became practical to distribute a processor into virtually every subsystem. As a result, it has become possible to implement nearly any logic or mathematical concept in the avionic system software (e.g., Kalman filters, digital maps, coupled fire/flight control). Avionic systems have, in fact, reached the point where software is no longer simply a part of the system, software is the system. B.G.

N83-22123# Ada Joint Program Office, Arlington, Va.
ADA STATUS AND OUTLOOK **c61**
John F. Kramer, Jr. *In* AGARD Software for Avionics Jan. 1983 6 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The ADA programming language is discussed. Author

N83-22124# Ministry of Defence, Paris (France).
D-12 STANDARDIZING LTR FOR ONBOARD COMPUTERS: THE PRESENT AND THE FUTURE [STANDARDISATION DU LTR POUR CALCULATEURS EMBARQUES] **c61**
Ica deMontcheuil *In* AGARD Software for Avionics Jan. 1983 10 p In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Numerous developments have taken place since the LTR language was standardized in France in 1974 for operational military applications, so the language is effectively used in more operational onboard problems systems and in development. The LTR V2 language meets the principal criteria, produces an effective code, covers specific needs, has facility for writing or modifying programs, and has an adequate production chain. Because of the progress of programming techniques, a strategy must be defined for the future. It is not possible to wait in hope that ADA can provide a solution since examination of its definition raises fears about its effective usage for onboard systems application. This is why a strategy offering the best guarantee was defined - renewing the LTR language to profit from technological improvements, while preserving the effectiveness of acquisition and the possibility of utilization. This language, called LTR V3 is presented along with its supervisor programming. Transl. by A.R.H.

N83-22125# Naval Weapons Center, China Lake, Calif.
OPERATIONAL FLIGHT PROGRAM DEVELOPMENT WITH A HIGHER ORDER LANGUAGE **c61**
R. E. Westbrook and L. L. Crews *In* AGARD Software for Avionics Jan. 1983 4 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The problems and the future trends and solutions to many of the problems of developing Operational Flight Programs (OFP) for embedded computer systems are presented. Author

N83-22126# Marconi Avionics Ltd., Boreham Wood (England).
THE USE OF HIGH ORDER LANGUAGES ON MICROPROCESSORS **c61**
R. M. Boardman *In* AGARD Software for Avionics Jan. 1983 5 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The use of high order languages on microprocessors is addressed. The special features of the software tools (compilers, loaders, etc.) and support environments which are highly desirable if the high order languages are to be used effectively are described. The impact of high order languages on programming and documentation techniques is discussed, and the implications for both Off Line and On Line Testing are considered. Microprocessors which are embedded within larger systems and which are dedicated to specific tasks, for example display drivers or signal processing units are discussed. For the majority of systems these tasks are real time. For most avionics applications the microprocessors are fitted with the minimum amount of memory, usually a mixture of ROM and RAM, and have a minimum of interfaces with the outside world. These interfaces are frequently special purpose. The practical application of a High Order Language to this type of microprocessor based project is described in the forms of a Case Study. Author

N83-22127# Ferranti Computer Systems Ltd., Gwent (England).
SOFTWARE DESIGN AND DEVELOPMENT USING MASCOT **c61**
R. Dibble *In* AGARD Software for Avionics Jan. 1983 15 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The MASCOT methodology was developed to contain increasing software costs and ensure the production of reliable software. Ferranti programmers produced standard MASCOT products and developed several large real time application using MASCOT. Their experience are discussed. A basic feature of the methodology is modularity, which produces benefits at all stages of software development, although the degree of decomposition required by MASCOT is a problem for most projects. MASCOT identifies three types of modules (Activities, Channels and Pools) and represents the design in a diagrammatic form (the ACP diagram) which is regarded as a useful design tool and an effective representation of that design. Formal definition of data and its access mechanisms is an improvement over existing practices but whether it significantly eases the problems of multiprocessor design is disputed. Overall there is a price to be paid for the MASCOT method in terms of runtime overheads and we see how this problem was resolved by various projects. The advantages and disadvantages of MASCOT are discussed and related to avionic software requirements. The relevance of the design philosophy to the imminent arrival of ADA is considered. Author

N83-22128# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Aircraft Div.
SAFETY CRITICAL FAST-REAL-TIME SYSTEMS **c06**
B. Guesmann, O. F. Nielsen, and R. Hanson *In* AGARD Software for Avionics Jan. 1983 6 p refs Sponsored in part by Bundesministerium der Verteidigung (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The development of advanced military aircraft requires large

embedded digital systems and digital test equipment for performance enhancement. Examples at MBB are CCV III, an eight computer test rig for evaluating next-generation fly-by-wire systems and cross software test systems (CSTS) for verifying safety critical airborne software. Typical cycle times of such systems range from 10 to 60 msec. Such systems impose restrictions on software design and development tools, especially on required high order language tools. Four languages, FORTRAN, PEARL, C and PASCAL were evaluated for use in the CCV III system and CSTS. Finally C was chosen to implement both systems with very satisfactory results. A comment will be given with respect to convert C programmed systems to ADA in the future. Author

N83-22129# Naval Postgraduate School, Monterey, Calif.
USABILITY OF MILITARY STANDARDS FOR THE MAINTENANCE OF EMBEDDED COMPUTER SOFTWARE **c06**
Norman F. Schneidewind *In* AGARD Software for Avionics Jan. 1983 6 p refs Sponsored in part by the Dept. of the Navy (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Several military software standards were examined and evaluated with respect to their applicability and usability for maintaining embedded computer software. These standards included the following: Department of the Navy Tactical Digital System Documentation Standards, SECNAVINST 3560.1; MIL-STD 1979, Navy Military Standard for Weapon System Development; and Weapon Specification 8506. These standards were discussed from three standpoints: (1) the degree to which they support the use of newer software development technologies (e.g., requirements analysis methodologies) for improving software maintenance; (2) the effect of the microcomputer and its software development environment on the application of these standards; and (3) the extent to which these standards enhance traceability (tracing the various levels of related documentation). These aspects required a reevaluation of the applicability of software standards. A recommendation is made to use the A7-E Aircraft software redesign project as a model for improving (1) and (3) in the three standards. Item (2) was judged to be not relevant to the development of software standards. Author

N83-22130# Kongsberg Vapenfabrikk A/S (Norway).
SOFTWARE CONFIGURATION MANAGEMENT AT WORK **c61**
Jan Tore Pedersen *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Software configuration management is dicussed. Author

N83-22131# Marconi Avionics Ltd., Boreham Wood (England).
CONFIGURATION MANAGEMENT AND THE ADA PROGRAMMING SUPPORT ENVIRONMENT **c61**
Kevin J. Pulford *In* AGARD Software for Avionics Jan. 1983 10 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

It is the aim of software development environments to increase the efficiency with which software is produced. One such environment is the ADA programming support environment (APSE) initiated by the U.S. Department of Defence. These environments are a great benefit to programmers making some of their tasks much easier. They also offer great opportunities to monitor and control software development. This in its turn will affect the way that projects are organized and run, and it will affect project personnel jobs to varying extents. The way that projects will be affected by the adoption of an APSE is explored by considering the way that Configuration Management can be implemented in an APSE. Author

N83-22132*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOFTWARE FAULT TOLERANCE FOR REAL-TIME AVIONICS SYSTEMS **c61**
T. Anderson (Newcastle upon Tyne Univ.) and J. C. Knight *In* AGARD Software for Avionics Jan. 1983 6 p refs (For primary document see N83-22112 12-01)
(Contracts NAS1-14101; NAS1-14472)
Avail: NTIS HC A19/MF A01 CSCL 09B

Avionics systems have very high reliability requirements and are therefore prime candidates for the inclusion of fault tolerance techniques. In order to provide tolerance to software faults, some form of state restoration is usually advocated as a means of recovery. State restoration can be very expensive for systems which utilize concurrent processes. The concurrency present in most avionics systems and the further difficulties introduced by timing constraints imply that providing tolerance for software faults may be inordinately expensive or complex. A straightforward pragmatic approach to software fault tolerance which is believed to be applicable to many real-time avionics systems is proposed. A classification system for software errors is presented together with approaches to recovery and continued service for each error type. Author

N83-22133# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELECTRONIC WARFARE SOFTWARE **c61**
Rudy L. Shaw *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A three year effort which looked at various software cost reduction techniques within the framework of electronic warfare (EW) processing requirements is summarized. An EM processing characterization was undertaken to provide a data base for the following investigations, which are also summarized: (1) The investigation of the compatibility of instruction sets, which are used or have a near term possibility of being used in EW systems, to the EW processing tasks; (2) The investigation of high order languages and software structuring efficiencies based upon bench marks which characterized major EW functions. M.G.

N83-22134# Marconi Avionics Ltd., Boreham Wood (England).
AN EIGHT POINT TESTING STRATEGY FOR REAL TIME SOFTWARE **c61**
R. E. Wilson and N. Higson *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A strategy for testing real time modular software systems is described. The structure, objectives, and documentation considerations are addressed. The responsibilities of programming staff using such a strategy and the problems entailed in re-testing as result of errors detected at higher levels of testing are also considered. M.G.

N83-22135# Aeritalia S.p.A., Caselle Torinese (Italy). Gruppo Sistemi Avionici ed Equipaggiamenti.
TORNADO FLIGHT CONTROL SOFTWARE VALIDATION: METHODOLOGY AND TOOLS **c61**
Roberto Pelissero *In* AGARD Software for Avionics Jan. 1983 13 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Methods and tools adopted in the Tornado project to perform software confidence testing; investigation of failure effect, performance prediction, and assessment and read across between simulated and in flight behavior are described. The real time facility in use is based on an integrated hardware/software system that was ad-hoc designed to allow closed loop testing of the Tornado TF/AFDS subsystem with particular emphasis given to autopilot. The real equipments of interest are installed on an avionic rig and the flight conditions are obtained via a data flow to/from an external computing facility which performs both the acquisition/stimulation functions and the various simulations (aircraft, engine, sensors, etc.). The validity of the results achieved by the facility is confirmed by repetition of maneuvers performed during previous flights. In addition, other possible applications of such a facility are summarized. M.G.

N83-22136# Tracor, Inc., Warminster, Pa.
APPLICATIONS OF NETWORK MODELING AND ANALYSIS TO SYSTEM VALIDATION AND VERIFICATION **c61**

Gary M. Sundberg *In* AGARD Software for Avionics Jan. 1983 11 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Network logic modeling and analysis (NLMA), a manual analytic process derived from network analysis and Boolean logic, is described. Its main purpose is to verify and validate complex systems or concepts at any stage of development. Specific examples are given which illustrate the application of the method at each phase of the software life cycle. M.G.

N83-22137# Electronique Serge Dassault, St. Cloud (France).
IDA: SOFTWARE TEST LANGUAGE AND RELATED TOOLS [IDA: LANGUAGE DE TEST DU LOGICIEL ET OUTILS ASSOCIES.] **c61**
G. Lamarche and P. Taillibert *In* AGARD Software for Avionics Jan. 1983 15 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Results are described from a study conduct to define a group of methods which permit computerizing the test operation of real time software. The principal characteristics of the test language defined are presented. The different problems that can be encountered when using such a language are considered as well as the definition of a macrolanguage and a standard library of tools. A test tool particularly adapted to the case of a computer program behaving as a parallel processor is discussed.
Transl. by A.R.H.

N83-22138# Litton Technische Werke, Freiburg (West Germany).
SOFTWARE VERIFICATION OF A CIVIL AVIONIC AHR SYSTEM **c61**
Michael Kleinschmidt and Norbert Sandner *In* AGARD Software for Avionics Jan. 1983 9 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Requirements for software verification procedures to be used with highly integrated digital avionics software are defined. Verification tools are described along with their use in the testing of an attitude and heading reference system. M.G.

N83-22139# Aerospace Corp., Los Angeles, Calif. Information Sciences Research Office.
PROGRESS IN VERIFICATION OF MICROPROGRAMS **c61**
Stephen D. Crocker *In* AGARD Software for Avionics Jan. 1983 4 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Work on the development of a microcode verification system is described and a picture of how such a system might be used in the near future is given. Author

N83-22140# Naval Weapons Center, China Lake, Calif.
VALIDATION OF SOFTWARE FOR INTEGRATION OF MISSILES WITH AIRCRAFT SYSTEMS **c61**
J. R. McManis *In* AGARD Software for Avionics Jan. 1983 6 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Critical aspects involved in the validation of avionics software developed to integrate missiles with attack aircraft systems are addressed. The situation covered is where the missile and the aircraft both have embedded computer systems, and that they have evolved to their current state in separate and totally independent development efforts. M.G.

N83-22141# Ferranti Computer Systems Ltd., Gwent (England).
IMPLEMENTING HIGH QUALITY SOFTWARE **c61**
E. J. Dowling *In* AGARD Software for Avionics Jan. 1983 14 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

Various factors affecting program implementation are discussed and some solutions are considered, in particular the range of tools that is available, and the way they can be applied. The traditional debug program is shown to be only one part of the whole tool set. Finally, the advantages and problem of ADA and its environment (APSE) are discussed. Author

N83-22142# Institut de Genie Logiciel, Paris (France).
THE QUALITY OF AVIONICS SOFTWARE: SPECIFICATION AND EVALUATION [LA QUALITE DES LOCICIELS AVIONIQUES: SPECIFICATION ET EVALUATION] **c06**
G. Germain, M. Galinier, and M. Delacrois *In* AGARD Software for Avionics Jan. 1983 15 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

While the IEEE glossary defines software quality as the ensemble of characteristics of a software product relative to its ability to satisfy given needs (such as those established in written specifications), the characteristics of quality which can be modelled and measured are not specified. A total approach to quality is described including the levels of decomposition of parameters. The identification and evaluation of internal and external parameters of avionics software are discussed. Transl. by A.R.H.

N83-22143# Marconi Avionics Ltd., Rochester (England). Flight Controls Div.
DISSIMILAR SOFTWARE IN HIGH INTEGRITY APPLICATIONS IN FLIGHT CONTROLS **c08**
David J. Martin *In* AGARD Software for Avionics Jan. 1983 13 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The requirements of high integrity systems are defined and examples of failure surviving systems given. Having discussed the impact of digital processors on system design, various solutions are reviewed. Multiplex similar redundant systems are used widely in flight controls and some of their strengths and weaknesses are detailed. Software techniques applied to similar redundant systems are then briefly described. A dissimilar redundant solution, using two different microprocessors, is discussed and the impact of this architecture on software procedures is reported. Finally, a review of the strengths and weaknesses of the dissimilar architecture approach is given. M.G.

N83-22144# Marconi Avionics Ltd., Rochester (England).
THE MANAGEMENT OF A LARGE REAL-TIME MILITARY AVIONICS PROJECT **c06**
P. J. Carrington, R. M. Gisbey, and K. P. J. Manning *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The AQS 901, an airborne submarine detection system installed in the Royal Australian Air Force Orion and the RAF Nimrod Long-Range Maritime Patrol Aircraft, is described. to counter the modern submarine threat, the development of sensor and processing systems to detect and locate the enemy submarine has a high priority. Expendable, sensitive underwater listening devices, called sonobuoys, pick up the faint but characteristics submarine sounds. These sonobuoy signals are transmitted on an radio frequency link to the aircraft where real-time analysis is performed by the AQS 901 Sonics Processor to extract the wanted signal from the noise, to present the data to the operator in the most easily assimilated form, and to provide a wide range of user options for display manipulation and data combination. The AQS 901 system consists of 22 units of special-purpose hardware and 150 K of CORAL software. The project started in 1973, the first flight trials took place in 1977, and the system went into service in 1980. The software is now in maintenance. R.J.F.

N83-22145# McDonnell Aircraft Co., St. Louis, Mo.
F/A-18 SOFTWARE DEVELOPMENT: A CASE STUDY **c61**
T. V. McTigue *In* AGARD Software for Avionics Jan. 1983 15 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A01/MF A01

A description of the successful avionics software development for the U.S. Navy/McDonnell Douglas F/A-18 Hornet Fighter/Attack Weapon System is given. The avionics computer subsystem consists of two central mission computers and a number of

distributed processors embedded in various sensor and display subsystems. This distributed processing system is interconnected by and communicates over a MIL STANDARD 1553A serial 1 MHz command/response multiplex network. The avionics software architecture is discussed and the rationale is presented for the partitioning of the software tasks between the central mission computers and the distributed processors are also discussed. Finally, the design of the operational flight program for the central mission computers is described, including a discussion of the development process and support facilities which were used for the software integration and validation. R.J.F.

N83-22146# Bundesakademie fuer Wehrverwaltung und Wehrtechnik, Mannheim (West Germany).
A LIFE CYCLE MODEL FOR AVIONIC SYSTEMS c06
Helmut Schaaff *In* AGARD Software for Avionics Jan. 1983 7 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A life cycle model that puts emphasis on design activities of avionics system is given. The objective of the project management of an avionic system must be to bring forth the user requirements as completely, as correctly and as early as possible because this saves money and time. The life cycle model presented helps to achieve this especially by the introduction of the formal activity functional design and its distinct separation from the technical design. The presented model is valid for avionic systems, but not only for these. It is valid for military embedded computer systems in general. R.J.F.

N83-22147# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
AVIONICS SOFTWARE SUPPORT COST MODEL c06
Daniel V. Ferens *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

The development of the Avionics Software Support Cost Model (ASSCM) is discussed. ASSCM promises to represent a significant milestone in the area of software life cycle cost analysis. The use of historical data insures that ASSCM reflects actual costs of software support, as well as the policies and procedures used by USAF Air Logistics Centers to support software. The use of the Delphi survey results enables ASSCM to be useful for a wide variety of avionic software programs. The model was designed to be easy to use, especially during the conceptual or early design phase of a software program. Minimal input data is required. The model was developed in a modular format so that the model would be relatively easy to modify as new data becomes available or new application types are added. ASSCM can be useful to some degree for many U.S. and NATO software programs, especially on military avionics projects. The model may need some degree of modification for applications significantly different from those for which ASSCM was developed. R.J.F.

N83-22148# National Aerospace Lab., Amsterdam (Netherlands).
A SOFTWARE-COST DATABASE FOR AEROSPACE SOFTWARE DEVELOPMENT c61
G. J. Dekker *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A user-friendly method for the collection, storage and retrieval of software-cost data was developed, with emphasis on aerospace software projects. Data is and will be collected regarding 47 well-defined cost factors, divided in 8 classes. It is felt that the clear definition of these cost factors will be of main importance for the applicability of the collected data. When suitable data is available for completed projects, the impact of these factors on the software development cost can be estimated. This will lead to a more reliable cost estimation and cost management method. The cost estimation method that will be calibrated by means of the collected data, the implemented data collection and retrieval system, called a software-cost database, and the use of this system as management tool during running projects are described. R.J.F.

N83-22149# Ministry of Defence, London (England).
THE MILITARY USER VIEW OF SOFTWARE SUPPORT THROUGHOUT THE IN-SERVICE LIFE OF AVIONIC SYSTEMS c06
S. J. Barker and B. Hambling *In* AGARD Software for Avionics Jan. 1983 5 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

It is argued that software-based military avionic systems should be considered as vehicles requiring continuous software development throughout their operating life. The reasons for software change are discussed and emphasis is given to an increasing need to adapt avionic systems to match a changing hostile environment with both speed and safety. More thought should be given to basic system design to facilitate both hardware and software replacement by greater modularity and reduced hardware/software dependence. Some examples of current system inadequacies are given. The need to reduce the cost of software development is emphasized and the type of software support environment as envisaged in the current ADA/APSE development is seen as a significant step towards this end. R.J.F.

N83-22150# British Aerospace Aircraft Group, Woodford (England).
DESIGN OF A SOFTWARE MAINTENANCE FACILITY FOR THE RAF c61
John Whailey and Timothy H. Scott-Wilson *In* AGARD Software for Avionics Jan. 1983 10 p refs Sponsored in part by the U.K. Ministry of Defence (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

In order to establish the size of the software maintenance team required for the airborne computing system, it is necessary to have some measurement of software reliability and the number of system requirement changes likely to affect the software configuration. The data available to date is largely empirical and further research is required to establish acceptable techniques. Various options were discussed in order to satisfy the requirement for a software maintenance facility for the Central Navigation System of Nimrod AEW Mk 3, the configuration finally chosen for the software testing rig consisting of a mixture of aircraft hardware and computer based simulations of the system dynamics. The effort required in maintenance could be reduced in future by the adoption of better software design techniques, the adoption of computer based management packages and improved software testing tools. R.J.F.

N83-22151# Naval Air Development Center, Warminster, Pa. Software and Computer Directorate.
A SOFTWARE ENGINEERING ENVIRONMENT (SEE) FOR WEAPON SYSTEM SOFTWARE c61
H. G. Stuebing *In* AGARD Software for Avionics Jan. 1983 16 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A Software Engineering Environment (SEE) was designed, developed, and used for the life-cycle support of weapon system software. This SEE consists of a software system that runs on a commercial multicomputer configuration. The approach features increased management visibility of the software development process, increased programmer productivity through automation, reducing the cost-of-change during maintenance, and the use of automated regression testing to improve software quality. These facilities were used for seven years to develop and maintain weapon system software for several projects. Accomplishments, refinements to the code and test functions, and a general approach to extend the capabilities into the requirements and design phases are described. Techniques are described that simultaneously allow different methodologies, programming languages, and target computers to be implemented on the same host computer. Also discussed is the implementation of a SEE in a distributed computer network. R.J.F.

N83-22152# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

ON AIRCRAFT TEST SOFTWARE FOR FIRST LINE MAINTENANCE **c61**
H. Klenk *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

A method is presented to provide suitable flexibility and easy maintenance for a test software package, even when written in a lower level language. The method essentially consists of a decisive separation of the test software package into an executive part and a descriptive part for the avionic hardware. Because the executive part is independent of the special avionic equipment, hardware modificatons result only in a change of the descriptive part of the software. These changes are easy to handle and suitable for future standardized methods using modern software development tools. The separation method was used to design and implement on-aircraft test software with good results. R.J.F.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N83-22153*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL SIMULATION OF SEPARATED FLOWS Ph.D. Thesis - Stanford Univ., Calif.
Philippe R. Spalart, Anthony Leonard, and Donald Baganoff (Stanford Univ., Calif.) Feb. 1983 174 p refs
(NASA-TM-84328; A-9232; NAS 1.15:84328) Avail: NTIS HC A08/MF A01 CSCL 01A

A new numerical method, based on the Vortex Method, for the simulation of two-dimensional separated flows, was developed and tested on a wide range of gases. The fluid is incompressible and the Reynolds number is high. A rigorous analytical basis for the representation of the Navier-Stokes equation in terms of the vorticity is used. An equation for the control of circulation around each body is included. An inviscid outer flow (computed by the Vortex Method) was coupled with a viscous boundary layer flow (computed by an Eulerian method). This version of the Vortex Method treats bodies of arbitrary shape, and accurately computes the pressure and shear stress at the solid boundary. These two quantities reflect the structure of the boundary layer. Several versions of the method are presented and applied to various problems, most of which have massive separation. Comparison of its results with other results, generally experimental, demonstrates the reliability and the general accuracy of the new method, with little dependence on empirical parameters. Many of the complex features of the flow past a circular cylinder, over a wide range of Reynolds numbers, are correctly reproduced. A.R.H.

N83-22154*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF WING AND TAIL LOCATION ON THE AERODYNAMIC CHARACTERISTICS OF AN AIRPLANE FOR MACH NUMBERS FROM 0.25 TO 4.63
M. Leroy Spearman Mar. 1983 30 p refs
(NASA-TM-84643; NAS 1.15:84643) Avail: NTIS HC A03/MF A01 CSCL 01A

Experimental investigations have been conducted to determine the effect of wing vertical position and horizontal-tail vertical and axial position on the static aerodynamic characteristics of a wing-body horizontal-tail configuration. The configurations investigated included the wing in a high, mid, or low position on the body with the horizontal tail in each of these vertical positions as well as in three axial positions. The closest position of the horizontal tail to the wing essentially provided on all-wing configuration. In addition, tests were made for the three wing positions with the horizontal tail removed. The tests were made in three different wind tunnels to provide data for a Mach number range from 0.25 to 4.63. The purpose of the investigation was to illustrate the strong effects of interference flow fields as a function of geometry and flight regime. An analysis of the results indicate some arrangements that might lead to aerodynamic problems and others in which the interference flow fields might be favorably exploited. The results suggest that a coplanar concept with a translating horizontal tail could potentially minimize the aerodynamic changes with Mach number and provide more optimum performance over the Mach number range. Author

N83-22155*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
UNSTEADY LAMINAR BOUNDARY-LAYER CALCULATIONS ON OSCILLATING CONFIGURATIONS INCLUDING BACKFLOW. PART 1: FLAT PLATE, OSCILLATING IN ITS OWN PLANE
W. Geissler Mar. 1983 29 p refs
(NASA-TM-84319; A-9211; NAS 1.15:84319) Avail: NTIS HC A03/MF A01 CSCL 01A

A finite difference method has been developed to calculate the unsteady boundary layer over an oscillating flat plate. Low- and high frequency approximations were used for comparison with numerical results. Special emphasis was placed on the behavior of the flow and on the numerical calculation procedure as soon as reversed flow has occurred over part of the oscillation cycle. The numerical method displayed neither problems nor singular behavior at the beginning of or within the reversed flow region. Calculations, however, came to a limit where the back-flow region reached the plate's leading edge in the case of high oscillation amplitudes. It is assumed that this limit is caused by the special behavior of the flow at the plate's leading edge where the boundary layer equations are not valid. Author

N83-22156*# Kentron Technical Center, Hampton, Va.
AN INTERACTIVE GRAPHICS PROGRAM FOR MANIPULATION AND DISPLAY OF PANEL METHOD GEOMETRY Final Report
Jon F. Hall, Dan H. Neuhart, and Kenneth B. Walkley Mar. 1983 45 p refs
(Contract NAS1-16000)
(NASA-CR-166098; NAS 1.26:166098) Avail: NTIS HC A03/MF A01 CSCL 01A

Modern aerodynamic panel methods that handle large, complex geometries have made evident the need to interactively manipulate, modify, and view such configurations. With this purpose in mind, the GEOM program was developed. It is a menu driven, interactive program that uses the Tektronix PLOT 10 graphics software to display geometry configurations which are characterized by an abutting set of networks. These networks are composed of quadrilateral panels which are described by the coordinates of their corners. GEOM is divided into fourteen executive controlled functions. These functions are used to build configurations, scale and rotate networks, transpose networks defining M and N lines, graphically display selected networks, join and split networks, create wake networks, produce symmetric images of networks, repanel and rename networks, display configuration cross sections, and output network geometry in two formats. A data base management system is used to facilitate data transfers in this program. A sample session illustrating various capabilities of the code is included as a guide to program operation. S.L.

N83-22157*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN AERODYNAMIC ASSESSMENT OF VARIOUS SUPERSONIC FIGHTER AIRPLANES BASED ON SOVIET DESIGN CONCEPTS
M. Leroy Spearman Mar. 1983 25 p refs
(NASA-TM-84647; NAS 1.15:84647) Avail: NTIS HC A02/MF A01 CSCL 01A

The aerodynamic, stability, and control characteristics of several supersonic fighter airplane concepts were assessed. The configurations include fixed-wing airplanes having delta wings, swept wings, and trapezoidal wings, and variable wing-sweep airplanes. Each concept employs aft tail controls. The concepts

vary from lightweight, single engine, air superiority, point interceptor, or ground attack types to larger twin-engine interceptor and reconnaissance designs. Results indicate that careful application of the transonic or supersonic area rule can provide nearly optimum shaping for minimum drag for a specified Mach number requirement. Through the proper location of components and the exploitation of interference flow fields, the concepts provide linear pitching moment characteristics, high control effectiveness, and reasonably small variations in aerodynamic center location with a resulting high potential for maneuvering capability. By careful attention to component shaping and location and through the exploitation of local flow fields, favorable roll-to-yaw ratios may result and a high degree of directional stability can be achieved. A.R.H.

N83-22158*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN AERODYNAMIC ASSESSMENT OF VARIOUS MISSILE CONFIGURATION CONCEPTS

M. Leroy Spearman Mar. 1983 36 p refs
(NASA-TM-84651; NAS 1.15:84651) Avail: NTIS HC A03/MF A01 CSCL 01A

Missile configuration concepts are examined with a view toward determining the most suitable geometric arrangements for the different mission applications and to determine means whereby missile performance might be improved in terms of maneuverability, aerodynamic efficiency, aerodynamic range, and design simplicity. Aerodynamic systems receive the most attention primarily because of the potential for increased reliability and the probability of lower cost of the less sophisticated aerodynamic concepts. Among the geometric variables that were investigated are the afterbody shape, the forebody shape, the wing and tail planform and location, the use of various types of propulsion systems, and the use of various types of control sytems including the aft tail, canard arrangements, and wing controls. Cruise missiles and hypersonic airbreathing missiles are included. A.R.H.

N83-22159*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AUGMENTATION OF FIGHTER-AIRCRAFT PERFORMANCE BY SPANWISE BLOWING OVER THE WING LEADING EDGE

Arnan Seginer and Meir Salomon (SAL Engineering, Haifa, Israel) Mar. 1983 29 p refs
(NASA-TM-84330; A-9243; NAS 1.15:84330) Avail: NTIS HC A03/MF A01 CSCL 01A

Spanwise blowing over the wing and canard of a 1:35 model of a close-coupled-canard fighter airplane configuration (similar to the Kfir-C2) was investigated experimentally in low-speed flow. Tests were conducted at airspeeds of 30 m/sec (Reynolds number of 1.8 x 10 to the 5th power based on mean aerodynamic chord) with angle-of-attack sweeps from -8 to 60 deg, and yaw-angle sweeps from -8 to 36 deg at fixed angles of attack 0, 10, 20, 25, 30, and 35 deg. Significant improvement in lift-curve slope, maximum lift, drag polar and lateral/directional stability was found, enlarging the flight envelope beyond its previous low-speed/maximum-lift limit. In spite of the highly swept (60 deg) leading edge, the efficiency of the lift augmentation by blowing was relatively high and was found to increase with increasing blowing momentum on the close-coupled-canard configuration. Interesting possibilities of obtaining much higher efficiencies with swirling jets were indicated. M.G.

N83-22160*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AN ALGORITHM FOR USING A LASER ANEMOMETER TO DETERMINE MEAN STREAMLINE PATTERNS IN A TURBULENT FLOW

K. L. Orloff and P. K. Snyder Mar. 1983 14 p refs
(NASA-TM-84340; A-9274; NAS 1.15:84340) Avail: NTIS HC A02/MF A01 CSCL 01A

The technique of tracing out a mean flow streamline with a three dimensional laser Doppler anemometer (LDA) is discussed with respect to cumulative, systematic errors that are inherent when the motion of the LDA test point is in the direction of the local measured velocity. Using simple potential flows that have variable curvature and inflection points to simulate an LDA experiment, a streamline tracing algorithm is developed that minimizes these errors. Also, the test point path remains close to the correct streamline even when simulated statistical measurement variations are included. Author

N83-22161*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AEROPROPULSIVE CHARACTERISTICS OF TWIN SINGLE-EXPANSION-RAMP VECTORING NOZZLES INSTALLED WITH FORWARD-SWEPT WINGS AND CANARDS

Mary L. Mason and Francis J. Capone Mar. 1983 76 p refs
(NASA-TP-2133; L-15555; NAS 1.60:2133) Avail: NTIS HC A05/MF A01 CSCL 01A

The Langley 16 foot transonic tunnel was used to determine the aeropropulsive characteristics of twin single-expansion-ramp vectoring nozzles installed in a wing-body configuration with forward-swept wings. The configuration was tested with and without fixed canards. The test conditions included free-stream Mach numbers of 0.60, 0.90, and 1.20. The model angle of attack ranged from -2 deg to 14 deg; the nozzle pressure ratio ranged from 1.0 (jet off) to 9.0. The Reynolds number based on the wing mean aerodynamic chord varied from 3.0 x 10 to the 6th power to 4.8 x 10 to the 6th power, depending on Mach number. Aerodynamic characteristics were analyzed to determine the effects of thrust vectoring and the canard effects on the wing-afterbody-nozzle and the wing-afterbody portions of the model. Thrust vectoring had no effect on the angle of attack for the onset of flow separation on the wing but resulted in reduced drag at angle-of-attack values above that required for wing flow separation. The canard was found to have little effect on the thrust-induced lift resulting from vectoring, since canard effects occurred primarily on the wing. Author

N83-22162*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EXPERIMENTAL STUDY OF WING LEADING-EDGE DEVICES FOR IMPROVED MANEUVER PERFORMANCE OF A SUPERCRITICAL MANEUVERING FIGHTER CONFIGURATION

Michael J. Mann, Jarrett K. Huffman, Charles H. Fox, Jr., and Richard L. Campbell Mar. 1983 84 p refs
(NASA-TP-2125; L-15539; NAS 1.60:2125) Avail: NTIS HC A05/MF A01 CSCL 01A

Wind tunnel tests were conducted to examine the use of wing leading-edge devices for improved subsonic and transonic maneuver performance. These devices were tested on a fighter configuration which utilized supercritical-wing technology. The configuration had a leading-edge sweep of 45 deg and an aspect ratio of 3.28. The tests were conducted at Mach numbers of 0.60 and 0.85 with angles of attack from -0.5 deg to 22 deg. At both Mach numbers, sharp leading-edge flaps produced vortices which greatly altered the flow pattern on the wing and resulted in substantial reductions in drag at high lift. Underwing or pylon-type vortex generators also reduced drag at high lift. The vortex generators worked better at a Mach number of 0.60. The vortex generators gave the best overall results with zero toe-in angle and when mounted on either the outboard part of the wing or at both an outboard location and halfway out the semispan. Both the flaps and the vortex generators had a minor effect on the pitching moment. Fluorescent minitufts were found to be useful for flow visualization at transonic maneuver conditions. Author

N83-22163*# Boeing Commercial Airplane Co., Seattle, Wash.

AEROELASTIC LOADS PREDICTION FOR AN ARROW WING. TASK 1: EVALUATION OF R. P. WHITE'S METHOD Final Report

Christopher J. Borland and Marjorie E. Manro Washington NASA Mar. 1983 93 p refs
(Contract NAS1-15678)
(NASA-CR-3640; NAS 1.26:3640; D6-51762-1) Avail: NTIS HC A05/MF A01 CSCL 01A

The separated flow method is evaluated. This method was

developed for moderately swept wings with multiple, constant strength vortex systems. The flow on the highly swept wing used in this evaluation is characterized by a single vortex system of continuously varying strength. S.L.

N83-22164*# Boeing Commercial Airplane Co., Seattle, Wash.
AEROELASTIC LOADS PREDICTION FOR AN ARROW WING. TASK 2: EVALUATION OF SEMI-EMPIRICAL METHODS Final Report
Andre C. Wery, Robert M. Kulfan, and Marjorie E. Manro Washington NASA Mar. 1983 123 p refs
(Contract NAS1-15678)
(NASA-CR-3641; NAS 1.26:3641) Avail: NTIS HC A06/MF A01 CSCL 01A

The development and evaluation of a semi empirical method to predict pressure distributions on a deformed wing by using an experimental data base in addition to a linear potential flow solution is described. The experimental data accounts for the effects of aeroelasticity by relating the pressures to a parameter which is influenced by the deflected shape. Several parameters were examined before the net leading edge suction coefficient was selected as the best. S.L.

N83-22165*# United Technologies Corp., East Hartford, Conn. Research Center.
ANALYSIS OF UNSWEPT AND SWEPT WING CHORDWISE PRESSURE DATA FROM AN OSCILLATING NACA 0012 AIRFOIL EXPERIMENT. VOLUME 1: TECHNICAL REPORT Final Contractor Report
A. O. St.Hilaire and F. O. Carta Washington Mar. 1983 101 p refs
(Contract NAS1-16041; DA Proj. 1L1-61102-AH-45)
(NASA-CR-3567; NAS 1.26:3567) Avail: NTIS HC A06/MF A01 CSCL 01A

The unsteady chordwise force response on the airfoil surface was investigated and its sensitivity to the various system parameters was examined. A further examination of unsteady aerodynamic data on a tunnel spanning wing (both swept and unswept), obtained in a wind tunnel, was performed. The main body of this data analysis was carried out by analyzing the propagation speed of pressure disturbances along the chord and by studying the behavior of the unsteady part of the chordwise pressure distribution at various points of the airfoil pitching cycle. It was found that Mach number effects dominate the approach to and the inception of both static and dynamic stall. The stall angle decreases as the Mach number increases. However, sweep dominates the load behavior within the stall regime. Large phase differences between unswept and swept responses, that do not exist at low lift coefficient, appear once the stall boundary is penetrated. It was also found that reduced frequency is not a reliable indicator of the unsteady aerodynamic response in the high angle of attack regime. S.L.

N83-22166*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A COMMON GEOMETRIC DATA-BASE APPROACH FOR COMPUTER-AIDED MANUFACTURING OF WIND-TUNNEL MODELS AND THEORETICAL AERODYNAMIC ANALYSIS
Michael J. See (Kansas Univ., Lawrence) and James V. Cozzolongo Apr. 1983 27 p refs
(NASA-TP-2151; A-9169; NAS 1.60:2151) Avail: NTIS HC A03/MF A01 CSCL 01A

A more automated process to produce wind tunnel models using existing facilities is discussed. A process was sought to more rapidly determine the aerodynamic characteristics of advanced aircraft configurations. Such aerodynamic characteristics are determined from theoretical analyses and wind tunnel tests of the configurations. Computers are used to perform the theoretical analyses, and a computer aided manufacturing system is used to fabricate the wind tunnel models. In the past a separate set of input data describing the aircraft geometry had to be generated for each process. This process establishes a common data base by enabling the computer aided manufacturing system to use, via a software interface, the geometric input data generated for the theoretical analysis. Thus, only one set of geometric data needs to be generated. Tests reveal that the process can reduce by several weeks the time needed to produce a wind tunnel model component. In addition, this process increases the similarity of the wind tunnel model to the mathematical model used by the theoretical aerodynamic analysis programs. Specifically, the wind tunnel model can be machined to within 0.008 in. of the original mathematical model. However, the software interface is highly complex and cumbersome to operate, making it unsuitable for routine use. The procurement of an independent computer aided design/computer aided manufacturing system with the capability to support both the theoretical analysis and the manufacturing tasks was recommended. S.L.

N83-22167*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A 14-PERCENT-THICK NASA PHASE 2 SUPERCRITICAL AIRFOIL DESIGNED FOR A LIFT COEFFICIENT OF 0.7
Charles D. Harris, Robert J. McGhee, and Dennis O. Allison Dec. 1980 104 p refs
(NASA-TM-81912; L-13891; NAS 1.15:81912) Avail: NTIS HC A06/MF A01 CSCL 01A

The low speed aerodynamic characteristics of a 14 percent thick supercritical airfoil are documented. The wind tunnel test was conducted in the Low Turbulence Pressure Tunnel. The effects of varying chord Reynolds number from 2,000,000 to 18,000,000 at a Mach number of 0.15 and the effects of varying Mach number from 0.10 to 0.32 at a Reynolds number of 6,000,000 are included. S.L.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N83-22168*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHT ASSESSMENT OF A DATA-LINK-BASED NAVIGATION-GUIDANCE CONCEPT
Terence S. Abbott Apr. 1983 32 p refs
(NASA-TM-84493; L-15436; NAS 1.15:84493) Avail: NTIS HC A03/MF A01 CSCL 01C

With the proposed introduction of a data-link provision into the Air-Traffic-control (ATC) system, the capability will exist to supplement the ground-air, voice (radio) link with digital, data-link information. Additionally, ATC computers could provide, via the data link guidance and navigation information to the pilot which could then be presented in much the same manner as conventional navigation information. The primary objective of this study was to assess the feasibility and acceptability of using 4-sec and 12-sec information updating to drive conventional cockpit-navigation-instrument formats for path-tracking guidance. A flight test, consisting of 19 tracking tasks, was conducted and, through the use of pilot questionnaires and performance data, the following results were obtained. From a performance standpoint, the 4-sec and 12-sec updating led to a slight degradation in path-tracking performance, relative to continuous updating. From the pilot's viewpoint, the 12-sec data interval was suitable for long path segments (greater than 2 min of flight time), but it was difficult to use on shorter segments because of higher work load and insufficient stabilization time. Overall, it was determined that the utilization of noncontinuous data for navigation was both feasible and acceptable for the prescribed task. Author

N83-22169# Committee on Commerce, Science, and Transportation (U. S. Senate).
NATIONAL AIRSPACE SYSTEM PLAN

Washington GPO 1982 93 p Hearing before the Subcomm. on Aviation of the Comm. on Com., Sci. and Transportation, 97th Congr., 2d Session, 24 Jun. 1982
(GPO-98-029) Avail: Subcommittee on Aviation

Four pertinent issues were addressed: the adequacy of the National Airspace System (NAS) as a planning document, FAA's management capability, the mode S data link and transponder, and replacement of the en route computer replacement. B.G.

N83-22170# Notre Dame Univ., Ind. Fire Research Group.
NUMERICAL CALCULATIONS OF TURBULENT BUOYANT FLOW IN AIRCRAFT CABINS Final Report
K. T. Yang, J. R. Loyd, A. M. Kanury, and K. Satoh Atlantic City FAA Mar. 1983 52 p refs
(Contract NB81-NADA-2000)
(FAA-CT-82-61) Avail: NTIS HC A04/MF A01

The UNDSAFE computer code is utilized to study the spread of fire and smoke in aircraft cabins due to fires located in the cabin floor. A simulation study is first made based on expected data to establish the equivalence between two dimensional and three dimensional parameters including fire distribution and shape, the doorway height, and level of turbulence and also the effects of these parameters on the fire and smoke spread. The computer code is then used to simulate the spread of fire and smoke in a wide body aircraft cabin with and without seats for two different scenarios of the fire location. The results show the dramatic effects of the seats on the flow, temperature, and smoke concentration behaviors inside the cabin. Important parameters have been identified such as the seat back height and the configuration of the seat bottom, closed or open. Author

N83-22171# Simula, Inc., Tempe, Ariz. Technical Center.
COMPUTER SIMULATION OF AN AIRCRAFT SEAT AND OCCUPANT IN A CRASH ENVIRONMENT, VOLUME 1 Final Report, Sep. 1980 - Sep. 1982
David H. Laananen, Akif O. Bolukbasi, and Joseph W. Coltman Mar. 1983 200 p refs
(Contract DTFA03-80-C-00098)
(FAA-CT-82-33-1-Vol-1; TR-82401) Avail: NTIS HC A09/MF A01

A mathematical model of an aircraft seat, occupant, and restraint system was developed for use in analysis of light aircraft crashworthiness. Because of the significant role played by the seat in overall system crashworthiness, a finite element model of the seat structure was included. The seat model can accommodate large plastic deformations and includes the capability for simulation of local buckling of bending members. Because the program was written for use primarily by engineers concerned with the design and analysis of seat and restraint systems, an effort was made to minimize the input data required to describe the occupant. The development of the mathematical model of the occupant, the finite element seat analysis, validation, and organization of the computer program are discussed. M.G.

N83-22172# Simula, Inc., Tempe, Ariz. Technical Center.
COMPUTER SIMULATION OF AN AIRCRAFT SEAT AND OCCUPANT IN A CRASH ENVIRONMENT. VOLUME 2: PROGRAM SOM-LA USER MANUAL Final Report, Sep. 1980 - Sep. 1982
David H. Laananen, Joseph W. Coltman, and Akif O. Bolukbasi Mar. 1983 235 p refs
(Contract DTFA03-80-C-00098)
(FAA-CT-82-33-2-Vol-2; TR-81415) Avail: NTIS HC A11/MF A01

A mathematical model of an aircraft seat, occupant, and restraint system was developed for use in analysis of light aircraft crashworthiness. Instructions for preparing input data and operating the program are presented and supported by detailed examples. Sample material properties and modeling parameters are also included. M.G.

N83-22173# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
A STUDY OF BIRD INGESTIONS INTO LARGE HIGH BYPASS RATIO TURBINE AIRCRAFT ENGINES Interim Report, May 1981 - Apr. 1982
Gary Frings Mar. 1983 60 p
(FAA Proj. 182-320-100)
(FAA-CT-82-144) Avail: NTIS HC A04/MF A01

A 1 year study has been conducted to document the numbers, weights, and species of birds being ingested into large high bypass ratio aircraft turbine engines. This study will continue into a second year. This interim presents the findings to date. Author

N83-22174# Factory Mutual Research Corp., Norwood, Mass.
COMPUTER MODELING OF AIRCRAFT CABIN FIRE PHENOMENA
M. A. Delichatsios, R. L. Alpert, L. Orloff, and M. K. Mathews Oct. 1982 65 p refs
(Contract NB81-NADA-2007)
(PB83-119891; NBS-GCR-82-404) Avail: NTIS HC A04/MF A01 CSCL 01C

A two layer integral model is presented for the calculation of turbulent wall flows on a vertical wall including a burning wall. The turbulent flow is divided into inner and outer turbulent regimes. These regimes are matched on a dividing streamline after appropriate wall laws for the turbulent flow have been developed. Wall laws, which depend on the specific boundary conditions, are proposed for an adiabatic wall plume, with addition of an inert material at the wall and a burning wall. The present methodology could be used also to develop wall flow laws for a constant temperature or constant heat flux wall and the overfire region above a burning wall. Numerical results are presented for an adiabatic wall flow with constant buoyancy flux and a burning wall without appreciable radiation. GRA

N83-22180# KLM Royal Dutch Airlines, Amsterdam (Netherlands). Aircraft Performance Dept.
THE AIRLINE FACING THE PRESENT CRISIS
J. H. Wagenmakers *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 7 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

N83-23210# Supreme Court of South Africa, Pretoria. Commission of Inquiry into Civil Aviation in South Africa.
CO-ORDINATION IN AVIATION IN SOUTHERN AFRICA
C. S. Margo *In* CSIR Ann. Transportation Conv., Vol. 1 1982 13 p (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

N83-23234# Department of Transport, Pretoria (South Africa).
HUMAN FACTORS IN AIR SAFETY
J. J. S. Germishuys *In* CSIR Ann. Transportation Conv., Vol. 4 1982 8 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N83-22175# Radio Technical Commission for Aeronautics, Washington, D. C.
MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRBORNE AREA NAVIGATION EQUIPMENT USING VOR/DME REFERENCE FACILITY SENSOR INPUTS
17 Sep. 1982 164 p refs Supersedes RTCA/DO-140
(RTCA/DO-180; RTCA/DO-140) Avail: NTIS HC A08/MF A01

Minimum Operational Performance Standards for Airborne Area

Navigation Equipment (2D and 3D) using VOR/DME reference facility sensor inputs are described. Incorporated within these standards are equipment characteristics that should be useful to users of the system as well as designers, manufacturers and installers. Functions and features for two types of systems are defined: A 2D system which provides only lateral guidance and a 3D system which provides both lateral and vertical guidance. Even though both 2D and 3D equipments are covered in this specification, the equipment manufacturer or installer may choose to build and test the equipment to only the 2D requirements. Author

N83-22176# Federal Aviation Agency, Atlantic City, N.J. Technical Center.
TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) EVALUATION. VOLUME 2: EQUIPPED THREAT PHASE AND AN ASSESSMENT IN AN ERROR-DEGRADED ENVIRONMENT Final Report, Nov. 1981 - Jan. 1982
Barry R. Billmann Apr. 1983 66 p refs
(FAA Proj. 052-243-340)
(FAA/CT-82-52-2-Vol-2) Avail: NTIS HC A04/MF A01

The results of certain aspects of Traffic Alert and Collision Avoidance System (TCAS) logic testing are presented. The TCAS logic significantly improved the resulting separation during encounters with TCAS equipped threats. Simplified command coordination procedures have increased command coordination reliability. Some minor logic modifications were identified to further enhance TCAS logic performance for TCAS equipped threats. The performance of the logic in the presence of reduced surveillance link reliability was also analyzed. The link reliability level required to affect adequate resolution and separation was identified. This analysis was conducted in a measurement error degraded environment. Review of flight test results indicate surveillance link reliability exceeds that required to affect adequate separation performance. S.L.

N83-22177# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AIR TRAFFIC CONTROL IN FACE OF USERS' DEMAND AND ECONOMY CONSTRAINTS
Feb. 1983 111 p refs In ENGLISH and FRENCH Conf. held in Lisbon, 15 Oct. 1982
(AGARD-CP-340; ISBN-92-835-0326) Avail: NTIS HC A06/MF A01

The role of air traffic control in reduction of operating costs for aircraft is addressed, including fuel conservation, economic constraints, civilian military coordination aspects, management, and planning concepts. For individual titles, see N83-22178 through N83-22187.

N83-22178# Civil Aviation Authority, London (England).
A UK NATS VIEW OF THE AIR TRAFFIC MANAGEMENT REQUIREMENTS IN THE NEXT DECADE
P. H. Hemming *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 5 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The main categories of user demand in United Kingdom airspace at present and the Air Traffic Management infrastructure currently provided are discussed. Aspects of NATS plans for improvement and modernization of air traffic control and the relationship of these plans to improved economy and fuel conservation are outlined. The main focus of these plans is related to development of ATC capability in the London and South East England area, therefore the redevelopment of the London Air Traffic Control Centre is described in the context of the theme of the Special Session. The relationship applicable to the United Kingdom between financial policy, implementation plans and the cost to system user is discussed in view of the constraints it places on the ability of the ATC system to meet commercial demand for the most economic service. Author

N83-22179# Civil Aviation Authority, London (England).
FUEL CONSERVATION AND ECONOMY CONSTRAINTS c44
D. Barber and J. C. Morrall *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 8 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

Fuel conservation in civil aviation may be achieved by increasing the efficiency of the aircraft themselves, by operating the aircraft more efficiently, and by providing them with a more efficient air traffic environment. Three aspects are discussed briefly, and possible improvements in the air traffic management environment are examined in more detail. Finally, attention is drawn to the Research and Development program needed to achieve fuel conservation by improved air traffic management. Author

N83-22180# KLM Royal Dutch Airlines, Amsterdam (Netherlands). Aircraft Performance Dept.
THE AIRLINE FACING THE PRESENT CRISIS c03
J. H. Wagenmakers *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 7 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The impact of the drastic fuel price increase on airline operations is briefly discussed. Some measures that are being taken to contain the economic effect are reviewed. In particular air traffic control (ATC) criteria and military constraints are highlighted, which are known to have a direct influence on fuel burn. This is illustrated with examples and furthermore a specific comment is made in relation to the Portuguese ATC environment. Author

N83-22181# Allied Air Forces Central Europe, Ramstein AFB (West Germany).
MILITARY REQUIREMENTS [LES BESOINS MILITAIRES]
J. DeDoncker *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 7 p In FRENCH (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

In view of the constraints affecting the military user, it is beneficial to question how much traffic control can contribute to solving actual problems which border largely on the matter of fuel costs. An outline of progress related to approval of the defense budget in member countries of the Atlantic Alliance illustrates how difficult it is in western demoncracies to obtain, in this crisis period, the credits needed to carry out the collective defense programs which were elaborated by NATO in consultation with member countries of the Alliance and approved by governmental authorities. Concrete results, obtained in recent years through the coordination of civilian and military partners responsible for space management provide a glimpse of models of action capable of contributing to a form of economy of costly fuel. These gains seem ridiculous when the question of means needed to realize a deliberately agreed upon policy is raised in all its seriousness. A.R.H.

N83-22182# Aeroportos e Navegacao Aerea E.P., Lisbon (Portugal).
AIR TRAFFIC SERVICES IN PORTUGAL
J. Freitas Carvalho *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 3 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The Portuguese area of responsibility for the provision of Air Traffic Services; and the organization of services and authorities are described. An overview is given of development projects, for the Lisboa and Santa Maria FIR's, their objectives basic concepts, and implementation dates. Author

N83-22183# Portuguese Air Force, Alfragide.
AIR TRAFFIC SERVICES IN PORTUGAL: CIVIL-MILITARY COORDINATION ASPECTS
Luis G. Rocha *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 7 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The provision in Portugal of Air Traffic Services in civil and

military aircraft and concurrent procedures is discussed. This assessment is based on a strictly military point of view having in account either its requirements or national and international involvements. All over the world the users of the airspace as well of the Air Traffic Control Systems are basically the General Aviation, Air Carriers with their trunk, regional and short haul categories and the military aviation. The effect that military activity has on ATC Systems is extremely inconstant depending on either air space structure or Air Traffic Services organization at each country.
Author

N83-22184# Federal Aviation Administration, Washington, D.C.
OVERVIEW OF UNITED STATES PROGRAM FOR MODERNIZING AIR TRAFFIC CONTROL AND AIRWAY FACILITIES
Robert W. Wedan and Paul R. Drouilhet (Lincoln Lab., Lexington, Mass.) *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 14 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The Federal Aviation Administration (FAA) recently completed a comprehensive plan for moderning the United States (U.S.) Air Traffic Control and Airways Facilities over the period from now to the year 2000. An overview of this plan is provided and description of some of the recent technological developments that provide the foundation for significant improvements to the system are discussed. These improvements include a new discrete address surveillance and data communications system, an airborne collision avoidance system that operates independently from the ground based air traffic control system, the replacement of the air traffic control computer facilities with modern equipment, the inclusion of a higher level of automation to aid the controllers and to provide greater freedom of severe precision landing aids using microwave equipment, and enhanced dissemination of severe weather information to controllers and pilots. Other innovations are also planned in order to meet an increasing demand for air traffic control services but without incurring a proportionate increase in the cost of providing these services.
Author

N83-22185# Ratcliffe (S.), Malvern (England).
MANAGEMENT AND PLANNING CONCEPTS
S. Ratcliffe *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 6 p (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The processes used for management and control of air traffic are outlined. Some congestion in airspace or at airports is inevitable, the further ahead this congestion is foreseen, the more economically it can be resolved. A limit is set by the accuracy with which the future can be predicted. Existing ATC systems necessarily use human controllers, who often significantly outnumber the aircraft under their control. It is not easy to see how this situation might be improved. Control tasks must be divided up between numerous controllers who, at busy times, cannot discuss each others problems in any detail. Controllers therefore solve only subsets of the total problem, and their solutions are significantly less efficient than theory indicates is possible. The extent to which 'automation' might make possible cheaper or more efficient ATC is safety considerations and difficult 'human factors' problems.
Author

N83-22186# Eurocontrol Agency, Brussels (Belgium).
DYNAMIC CONTROL OF INBOUND FLIGHTS FOR MINIMUM COST OPERATION
Andre Benoit and Sip Swierstra *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 32 p refs (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The Zone of Convergence (ZOC) concept is proposed as an essential short term Air Traffic Control contribution to the economics of air transport. It is established that, when considering traffic inbound to a medium to high density terminal, this approach could reduce fuel consumption by some ten to thirty percent, this value being referred to the total fuel burn in an extended area including and surrounding main terminal and extending over some 100, ideally 300, nautical miles. The selection of profiles tailored to the operators' criteria, whether constrained by ATC or not, is discussed in some detail. The compatibility of the techniques proposed with online operations is found to be satisfactory. This conclusion results from test conducted using ATC simulation facilities, airline flight simulators, and online exercises involving regular scheduled flights.
Author

N83-22187# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
INVESTIGATIONS ON FOUR-DIMENSIONAL GUIDANCE IN THE TMA
V. Adam and W. Lechner *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 11 p refs (For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

The four dimensional (4D) guidance of aircraft in the terminal area (TMA) allows for precise control of the minimum separation and thus efficient use of the available approach capacity of the respective airport. A concept for the 4D guidance of transport aircraft was developed and a corresponding control mode was integrated in an automatic flight control system for transport aircraft. The 4D mode is based on usual radar vector guidance technique of air traffic control and, therefore, is characterized by a succession of flight sections with constant values for indicated airspeed, heading and descent rate. The time of arrival is controlled by altering the path via a delay fan. The algorithm for the calculation of the commanded 4D flightpath takes into account suitable wind models updated by actual wind data. The 4D mode is described and first flight test results are discussed.
Author

N83-22099# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Lehrstuhl fuer Regeltechnik und Electronik.
IMAGE SUPPORTED NAVIGATION IN LOW ALTITUDES BASED ON THE DETECTION OF ROADS AND RIVERS
Rolf-Dieter Therburg *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 7 p (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-22188*# Boeing Vertol Co., Philadelphia, Pa.
LARGE ROTORCRAFT TRANSMISSION TECHNOLOGY DEVELOPMENT PROGRAM Final Test Report
J. C. Mack Mar. 1983 106 p
(Contract NAS3-22143)
(NASA-CR-168120; NAS 1.26:168120; D210-11944-1) Avail: NTIS HC A06/MF A01 CSCL 01C

Testing of a U.S. Army XCH-62 HLH aft rotor transmission under NASA Contract NAS 3-22143 was successfully completed. This test establishes the feasibility of large, high power rotorcraft transmissions as well as demonstrating the resolution of deficiencies identified during the HLH advanced technology programs and reported by USAAMRDLTR-77-38. Over 100 hours of testing was conducted. At the 100% design power rating of 10,620 horsepower, the power transferred through a single spiral bevel gear mesh is more than twice that of current helicopter bevel gearing. In the original design of these gears, industry-wide design methods were employed and failures were experienced which identified problem areas unique to gear size. To remedy this technology shortfall, a program was developed to predict gear stresses using finite element analysis for complete and accurate representation of the gear tooth and supporting structure. To validate the finite element methodology gear strain data from the existing U.S. Army HLH aft

transmission was acquired, and existing data from smaller gears were made available. Author

N83-22189# Systems Technology, Inc., Hawthorne, Calif.
FLYING QUALITIES OF RELAXED STATIC STABILITY AIRCRAFT, VOLUME 1 Final Report, Aug. 1981 - Oct. 1982
Roger H. Hoh, David G. Mitchell, Duane McRuer, and Thomas T. Myers Sep. 1982 96 p refs
(Contract DTFA-03081-C-00069)
(FAA-CT-82-130-1; TR-1178-1-1) Avail: NTIS HC A05/MF A01

Airworthiness assessment and flying qualities evaluation of highly augmented aircraft covered by Parts 23 and 25 of the Federal Aviation Regulations are addressed. Particular emphasis was placed on aircraft with relaxed static stability and on the use of active augmentation systems to achieve the minimum requirement for a level of safety in such aircraft. Significant modifications and expansion to the FAA Engineering Flight Test Guides are detailed. Author

N83-22190# Systems Technology, Inc., Hawthorne, Calif.
FLYING QUALITIES OF RELAXED STATIC STABILITY AIRCRAFT, VOLUME 2 Final Report, Aug. 1981 - Oct. 1982
Roger H. Hoh, David G. Mitchell, Duane McRuer, and Thomas T. Myers Sep. 1982 118 p refs
(Contract DTFA-03081-C-00069)
(FAA-CT-82-130-2; TR-1178-1-1) Avail: NTIS HC A06/MF A01

The relative similarities and differences between heavily augmented and conventional aircraft are determined. A number of important generic distinctions were found and are described and explained. Author

N83-22191*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF g SEAT AUGMENTATION OF FIXED-BASE/MOVING BASE SIMULATION FOR TRANSPORT LANDINGS UNDER TWO VISUALLY IMPOSED RUNWAY WIDTH CONDITIONS
Russell V. Parrish and George G. Steinmetz Apr. 1983 25 p refs
(NASA-TP-2135; L-15540; NAS 1.60:2135) Avail: NTIS HC A02/MF A01 CSCL 01C

Vertical-motion cues supplied by a g-seat to augment platform motion cues in the other five degrees of freedom were evaluated in terms of their effect on objective performance measures obtained during simulated transport landings under visual conditions. In addition to evaluating the effects of the vertical cueing, runway width and magnification effects were investigated. The g-seat was evaluated during fixed base and moving-base operations. Although performance with the g-seat only improved slightly over that with fixed-base operation, combined g-seat platform operation showed no improvement over improvement over platform-only operation. When one runway width at one magnification factor was compared with another width at a different factor, the visual results indicated that the runway width probably had no effect on pilot-vehicle performance. The new performance differences that were detected may be more readily attributed to the extant (existing throughout) increase in vertical velocity induced by the magnification factor used to change the runway width, rather than to the width itself. Author

N83-22192*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MOTION/VISUAL CUEING REQUIREMENTS FOR VORTEX ENCOUNTERS DURING SIMULATED TRANSPORT VISUAL APPROACH AND LANDING
Russell V. Parrish and Roland L. Bowles Apr. 1983 23 p refs
(NASA-TP-2136; L-15544; NAS 1.60:2136) Avail: NTIS HC A02/MF A01 CSCL 17G

This paper addresses the issues of motion/visual cueing fidelity requirements for vortex encounters during simulated transport visual approaches and landings. Four simulator configurations were utilized to provide objective performance measures during simulated vortex penetrations, and subjective comments from pilots were collected. The configurations used were as follows: fixed base with visual degradation (delay), fixed base with no visual degradation, moving base with visual degradation (delay), and moving base with no visual degradation. The statistical comparisons of the objective measures and the subjective pilot opinions indicated that although both minimum visual delay and motion cueing are recommended for the vortex penetration task, the visual-scene delay characteristics were not as significant a fidelity factor as was the presence of motion cues. However, this indication was applicable to a restricted task, and to transport aircraft. Although they were statistically significant, the effects of visual delay and motion cueing on the touchdown-related measures were considered to be of no practical consequence. Author

N83-22193*# McDonnell Aircraft Co., St. Louis, Mo.
THE YAV-8B SIMULATION AND MODELING. VOLUME 1: AIRCRAFT DESCRIPTION AND PROGRAM SUMMARY Final Report
1983 205 p refs
(Contract NAS4-2839)
(NASA-CR-170397; NAS 1.26:170397; MDC-A7910) Avail: NTIS HC A10/MF A01 CSCL 01C

A FORTRAN batch simulation of the YAV-8B aircraft and supporting documentation are presented. The aircraft is described. Simulation outputs are compared with flight test data. S.L.

N83-22194*# McDonnell Aircraft Co., St. Louis, Mo.
THE YAV-8B SIMULATION AND MODELING. VOLUME 2: PROGRAM LISTING Final Report
Mar. 1983 668 p refs
(Contract NAS4-2839)
(NASA-CR-170397; NAS 1.26:170397; MDC-A7910) Avail: NTIS HC A99/MF A01 CSCL 01C

Detailed mathematical models of varying complexity representative of the YAV-8B aircraft are defined and documented. These models are used in parameter estimation and in linear analysis computer programs while investigating YAV-8B aircraft handling qualities. Both a six degree of freedom nonlinear model and a linearized three degree of freedom longitudinal and lateral directional model were developed. The nonlinear model is based on the mathematical model used on the MCAIR YAV-8B manned flight simulator. This simulator model has undergone periodic updating based on the results of approximately 360 YAV-8B flights and 8000 hours of wind tunnel testing. Qualified YAV-8B flight test pilots have commented that the handling qualities characteristics of the simulator are quite representative of the real aircraft. These comments are validated herein by comparing data from both static and dynamic flight test maneuvers to the same obtained using the nonlinear program. S.L.

N83-22195# Naval Postgraduate School, Monterey, Calif.
US NAVY HELICOPTERS IN COMBAT SEARCH AND RESCUE M.S. Thesis
Dennis James Rowley Jun. 1982 42 p refs
(AD-A122451) Avail: NTIS HC A03/MF A01 CSCL 01/3

Research was conducted to examine the validity of the employment of U. S. Navy helicopters for the combat search and rescue (CSAR) mission. It is proposed that the Navy does not currently have the capability to conduct CSAR operations in an opposed environment with an acceptable loss rate. A mission description is offered including mission essentials, phases and profile. Current Battle Group helicopter assets are presented. Training and equipment shortfalls are noted. A discussion of resource management includes dollar, political and psychological costs. A proposal is offered to initiate a viable CSAR capability that recognizes the need for CSAR and makes its tactical development a matter of CNO policy, develops an appreciation for the fact that this is a TACAIR problem, and suggests a measured approach to solving the problem. Finally, a decision matrix is presented to assist the Battle Group Commander in the employment of his helicopter assets in the pursuit of a CSAR mission. GRA

N83-22102# Smiths Industries Ltd., Bishops Cleeve (England). Aerospace and Defence Systems Div.
THE USE OF MULTIPLEX DATA BUSES IN A HIGH INTEGRITY SYSTEM
P. Crouch and A. G. Seabridge (British Aerospace Aircraft Group) *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22103# Singer-Kearfott, Wayne, N. J.
ADVANCED DESIGN AND PERFORMANCE OPTIMIZATION TECHNIQUES UTILIZED TO DEVELOP THE F-111 WEAPONS/NAVIGATION COMPUTER (WNC)
Albert J. Shapiro *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22477# City Univ., London (England). Dept. of Mechanical Engineering.
FURTHER ADVANCES IN HELICOPTER VIBRATION CONTROL
G. T. S. Done *In* Shock and Vibration Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 17-22 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N83-22196*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TIME-BASED SELF-SPACING TECHNIQUES USING COCKPIT DISPLAY OF TRAFFIC INFORMATION DURING APPROACH TO LANDING IN A TERMINAL AREA VECTORING ENVIRONMENT
David H. Williams Apr. 1983 43 p refs
(NASA-TM-84601; L-15520; NAS 1.15:84601) Avail: NTIS HC A03/MF A01 CSCL 01D

A simulation study was undertaken to evaluate two time-based self-spacing techniques for in-trail following during terminal area approach. An electronic traffic display was provided in the weather radarscope location. The displayed self-spacing cues allowed the simulated aircraft to follow and to maintain spacing on another aircraft which was being vectored by air traffic control (ATC) for landing in a high-density terminal area. Separation performance data indicate the information provided on the traffic display was adequate for the test subjects to accurately follow the approach path of another aircraft without the assistance of ATC. The time-based technique with a constant-delay spacing criterion produced the most satisfactory spacing performance. Pilot comments indicate the workload associated with the self-separation task was very high and that additional spacing command information and/or aircraft autopilot functions would be desirable for operational implementational of the self-spacing task. Author

N83-22197*# University of Southern Colorado, Pueblo. School of Applied Science and Engineering Technology.
TECHNOLOGY RESEARCH FOR DIGITAL FLIGHT CONTROL Status Report, 1 Oct. 1982 - 31 Mar. 1983
R. A. Carestia 1983 12 p refs
(Contract NCC2-041)
(NASA-CR-170194; NAS 1.26:170194) Avail: NTIS HC A02/MF A01 CSCL 01D

The use of advanced digital systems for flight control and guidance for a specific mission is investigated. The research areas include advanced electronic system architectures, tests with the global positioning system (GPS) in a helicopter, and advanced integrated systems concept for rotorcraft. Emphasis is on a search and rescue mission, differential global positioning systems to provide a data base of performance information for navigation, and a study to determine the present usage and trends of microcomputers and microcomputer components in the avionics industries. S.L.

N83-22113# General Dynamics Corp., Fort Worth, Tex.
AVIONIC SOFTWARE DESIGN
David E. Sundstrom *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22116# Electronique Serge Dassault, St. Cloud (France).
TOWARDS A VERITABLE SUPERVISOR PROGRAM FOR AVIONICS SOFTWARE [VERS UN VERITABLE ATELIER DE LOGICIEL AVIONIQUE]
G. Bracon *In* AGARD Software for Avionics Jan. 1983 14 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22119# Electronique Serge Dassault, St. Cloud (France).
D.L.A.O.: A SUPPORT SYSTEM FOR DEFINING AVIONICS SOFTWARE [D.L.A.O.: UN SYSTEME D'AIDE]
Sylvie Chenut-Martin and Francois Doladille *In* AGARD Software for Avionics Jan. 1983 11 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22128# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Aircraft Div.
SAFETY CRITICAL FAST-REAL-TIME SYSTEMS
B. Guesmann, O. F. Nielsen, and R. Hanson *In* AGARD Software for Avionics Jan. 1983 6 p refs Sponsored in part by Bundesministerium der Verteidigung (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22129# Naval Postgraduate School, Monterey, Calif.
USABILITY OF MILITARY STANDARDS FOR THE MAINTENANCE OF EMBEDDED COMPUTER SOFTWARE
Norman F. Schneidewind *In* AGARD Software for Avionics Jan. 1983 6 p refs Sponsored in part by the Dept. of the Navy (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22142# Institut de Genie Logiciel, Paris (France).
THE QUALITY OF AVIONICS SOFTWARE: SPECIFICATION AND EVALUATION [LA QUALITE DES LOCICIELS AVIONIQUES: SPECIFICATION ET EVALUATION]
G. Germain, M. Galinier, and M. Delacrois *In* AGARD Software for Avionics Jan. 1983 15 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22144# Marconi Avionics Ltd., Rochester (England).
THE MANAGEMENT OF A LARGE REAL-TIME MILITARY AVIONICS PROJECT
P. J. Carrington, R. M. Gisbey, and K. P. J. Manning *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22146# Bundesakademie fuer Wehrverwaltung und Wehrtechnik, Mannheim (West Germany).
A LIFE CYCLE MODEL FOR AVIONIC SYSTEMS
Helmut Schaaff *In* AGARD Software for Avionics Jan. 1983 7 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22147# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
AVIONICS SOFTWARE SUPPORT COST MODEL
Daniel V. Ferens *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22149# Ministry of Defence, London (England).
THE MILITARY USER VIEW OF SOFTWARE SUPPORT THROUGHOUT THE IN-SERVICE LIFE OF AVIONIC SYSTEMS
S. J. Barker and B. Hambling *In* AGARD Software for Avionics Jan. 1983 5 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-22198*# Westinghouse Research and Development Center, Pittsburgh, Pa.
LABYRINTH SEAL FORCES ON A WHIRLING ROTOR Final Report
D. V. Wright Jan. 1983 111 p refs
(Contract NAS3-10825; DA Proj. 1L1-62209-AH-76)
(NASA-CR-168016; NAS 1.26:168016) Avail: NTIS HC A06/MF A01 CSCL 21E

An experimental investigation of air labyrinth seal forces on a subsynchronously whirling model rotor is described and test results are given for diverging, converging, and straight two-strip seals. The effects of pressure drop, provide basic experimental data needed in the development of design methods for predicting and preventing self-excited whirl of turbine rotors and other machines having labyrinth seals. The total dynamic seal forces on the whirling model rotor are measured accurately by means of an active damping and stiffness system that is adjusted to obtain neutral whirl stability of the model rotor system. In addition, the whirling pressure pattern in the seal annulus is measured for a few test conditions and the corresponding pressure forces on the rotor are compared with the total measured forces. This comparison shows that either radial and axial pressure gradients in the seal annulus or drag forces on the rotor are significant. Comparisons made between the measured seal forces and theoretical results show that present theory is inadequate. M.G.

N83-22199*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NUMERICAL SOLUTION TO THE GLANCING SIDEWALL OBLIQUE SHOCK WAVE/TURBULENT BOUNDARY LAYER INTERACTION IN THREE DIMENSION
B. H. Anderson and T. J. Benson 1983 23 p refs Presented at the 21st Aerospace Sci. Conf., Reno, Nev., 10-13 Jan. 1983; sponsored by AIAA Original document was announced as A83-16823
(NASA-TM-83056; E-1521; NAS 1.15:83056; AIAA-83-0136) Avail: NTIS HC A02/MF A01 CSCL 21E

A supersonic three-dimensional viscous forward-marching computer design code called PEPSIS is used to obtain a numerical solution of the three-dimensional problem of the interaction of a glancing sidewall oblique shock wave and a turbulent boundary layer. Very good results are obtained for a test case that was run to investigate the use of the wall-function boundary-condition approximation for a highly complex three-dimensional shock-boundary layer interaction. Two additional test cases (coarse mesh and medium mesh) are run to examine the question of near-wall resolution when no-slip boundary conditions are applied. A comparison with experimental data shows that the PEPSIS code gives excellent results in general and is practical for three-dimensional supersonic inlet calculations. F.G.M.

N83-22200*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL INVESTIGATION OF A TWO-DIMENSIONAL SHOCK-TURBULENT BOUNDARY LAYER INTERACTION WITH BLEED
W. R. Hinst and F. T. Tanji 1983 19 p refs Presented at the 21st Aerospace Sci. Conf., Reno, Nev., 10-13 Jan. 1983; sponsored by AIAA Announced in AIAA as A83-19581
(NASA-TM-83057; E-1522; NAS 1.15:83057; AIAA-83-0135) Avail: NTIS HC A02/MF A01 CSCL 21E

The two-dimensional interaction of an oblique shock wave with a turbulent boundary layer that included the effect of bleed was examined experimentally using a shock generator mounted across a supersonic wind tunnel The studies were performed at Mach numbers 2.5 and 2.0 and unit Reynolds number of approximately 2.0 x 10 to the 7th/meter. The study includes surface oil flow visualization, wall static pressure distributions and boundary layer pitot pressure profiles. In addition, the variation of the local bleed rates were measured. The results show the effect of the bleed on the boundary layer as well as the effect of the flow conditions on the local bleed rate. Author (IAA)

N83-22201*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
FLIGHT EVALUATION OF MODIFICATIONS TO A DIGITAL ELECTRONIC ENGINE CONTROL SYSTEM IN AN F-15 AIRPLANE
Frank W. Burcham, Jr., Lawrence P. Myers, and John R. Zeller 1983 12 p refs Presented at the 21st Aerospace Sci. Conf., Reno, Nev., 10-13 Jan. 1983; sponsored by AIAA Original document was announced as A83-19593
(NASA-TM-83088; E-1515; NAS 1.15:83088; AIAA-83-0537) Avail: NTIS HC A02/MF A01 CSCL 21E

The third phase of a flight evaluation of a digital electronic engine control system in an F-15 has recently been completed. It was found that digital electronic engine control software logic changes and augmentor hardware improvements resulted in significant improvements in engine operation. For intermediate to maximum power throttle transients, an increase in altitude capability of up to 8000 ft was found, and for idle to maximum transients, an increase of up to 4000 ft was found. A nozzle instability noted in earlier flight testing was investigated on a test engine at NASA Lewis Research Center, a digital electronic engine control software logic change was developed and evaluated, and no instability occurred in the Phase 3 flight evaluation. The backup control airstart modification was evaluated, and gave an improvement of airstart capability by reducing the minimum airspeed for successful airstarts by 50 to 75 knots. Author

N83-22202*# Boeing Military Airplane Development, Seattle, Wash.
FLOW ANALYSIS OF NOZZLE INSTALLATIONS WITH STRONG AIRPLANE FLOW INTERACTIONS
Donald W. Roberts Apr. 1982 67 p refs
(Contract NAS2-10100)
(NASA-CR-166466; NAS 1.26:166466) Avail: NTIS HC A04/MF A01 CSCL 21E

A numerical procedure has been developed to calculate the flow fields resulting from the viscous-inviscid interactions that occur when a strong jet exhaust and aircraft flow field coupling exists. The approach used in the current procedure is to divide the interaction region into zones which are either predominantly viscous or inviscid. The flow in the inviscid zone, which surrounds most of the aircraft, is calculated using an existing linearized potential flow code. The viscous flow zone, which encompasses the jet plume, is modeled using a parabolized Navier-Stokes code. The key feature of the present procedure is the coupling of the zonal solutions such that sufficient information is transferred between the zones to preserve the effects of the interactions. The zonal boundaries overlap with the boundary conditions being the information link between zones. An iteraction scheme iterates the coupled analysis until convergence has been obtained. The procedure has been successfully used for several test cases for which the computed results are presented. Author

N83-22203*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
AIRSTART PERFORMANCE OF A DIGITAL ELECTRONIC ENGINE CONTROL SYSTEM IN AN F-15 AIRPLANE
Stephen J. Licata and Frank W. Burcham, Jr. Apr. 1983 31 p refs
(NASA-TM-84908; NAS 1.15:84908) Avail: NTIS HC A03/MF A01 CSCL 21E

The airstart performance of the F100 engine equipped with a digital electronic engine control (DEEC) system was evaluated in an F-15 airplane. The DEEC system incorporates closed-loop airstart logic for improved capability. Spooldown and jet fuel starter-assisted airstarts were made over a range of airspeeds and altitudes. All jet fuel starter-assisted airstarts were successful, with airstart time varying from 35 to 60 sec. All spooldown airstarts at airspeeds of 200 knots and higher were successful; airstart times ranged from 45 sec at 250 knots to 135 sec at 200 knots. The effects of altitude on airstart success and time were small. The flight results agreed closely with previous altitude facility test results. The DEEC system provided successful airstarts at airspeeds at least 50 knots lower than the standard F100 engine control system. Author

N83-22204*# General Electric Co., Cincinnati, Ohio. Advanced Engineering and Technology Programs Dept.
ENERGY EFFICIENT ENGINE COMPONENT DEVELOPMENT AND INTEGRATION PROGRAM Semiannual Report, 1 Oct. 1980 - 31 Mar. 1981
30 Jan. 1981 412 p
(Contract NAS3-20643)
(NASA-CR-170089; NAS 1.26:170089; R81AEG316; SAR-6) Avail: NTIS HC A18/MF A01 CSCL 21E

The technology that will improve the energy efficiency of propulsion systems for subsonic commercial aircraft is investigated. A reduction of 14.4% in cruise installed sfc (0.572 versus 0.668 for the CF6-50C) and a direct operation cost reduction in excess of the 5% goal is projected. Noise and emissions projections are consistent with the established goals. S.L.

N83-22454*# Curtiss-Wright Corp., Wood-Ridge, N.J.
ADVANCED ROTARY ENGINES
Charles Jones *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 123-137 Original document was announced as A80-38982 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

N83-22455*# Teledyne Continental Motors, Mobile, Ala. General Products Div.
LIGHTWEIGHT DIESEL AIRCRAFT ENGINES FOR GENERAL AVIATION
Steven G. Berenyi *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 136-147 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

N83-22456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN OVERVIEW OF GENERAL AVIATION PROPULSION RESEARCH PROGRAMS AT NASA LEWIS RESEARCH CENTER
Edward A. Willis *In its* Aviation Gasolines and Future Alternatives May 1983 p 149-160 Original document was announced as N81-16052 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

N83-22457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GENERAL AVIATION TURBINE ENGINE (GATE) OVERVIEW
William C. Strack *In its* Aviation Gasolines and Future Alternatives May 1983 p 161-166 ref (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N83-22205*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFICIENT ALGORITHMS FOR COMPUTING TRIM AND SMALL-DISTURBANCE EQUATIONS OF MOTION OF AIRCRAFT COORDINATED AND UNCOORDINATED, STEADY, STEEP TURNS
Robert T. N. Chen Feb. 1983 41 p refs
(NASA-TM-84324; A-9220; NAS 1.15:84324) Avail: NTIS HC A03/MF A01 CSCL 01C

The development of computational algorithms that permit efficient calculation of aircraft trim states and of the associated small disturbance equations of motion for a systematic investigation of the statics and dynamics of aircraft in coordinated and uncoordinated, steady, steep turning flight is reported. The efficiency in the trim computation is realized by decoupling the governing equations. The small disturbance equations of motion, which are given in a general body axis system, include aerodynamic acceleration derivatives; they are cast in a familiar first order, vector matrix format of modern system theory. These algorithms were applied to a variety of rotorcraft simulation models. Results pertaining to a simulated hingeless rotor helicopter are also presented S.L.

N83-22206*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
INHERENT SPIRAL STABILITY IN A FIXED WING AIRCRAFT BY MEANS OF A SIMPLIFIED PNEUMATIC WING TIP CONTROL SYSTEM Progress Report, period ending 31 Dec. 1982
G. L. Goglia and Bukkinakere K. Arunkumar Apr. 1983 27 p refs
(Grant NsG-1177)
(NASA-CR-170207; NAS 1.26:170207) Avail: NTIS HC A03/MF A01 CSCL 01C

The concept of the lateralizer device is to sense the difference in wing tip static pressures (differential pressures being created by wing tip venturis) produced when any deviation from straight to level flight occurs. In a steady state turn the low slow wing tip experiences less venturi suction than the high fast wing tip. This signal activates the appropriate servos connected to the ailerons to produce a wing leveling restoring moment. If the wing is subjected to rolling velocities due to changes of the local angle of attack at the tip, the downgoing wing tip operates at a higher angle than the upgoing one. If with an increase in the angle of attack the signal is such that it increases the venturi pressure, then the servos are activated to produce the most negative signal to an upgoing aileron which results in a wing leveling restoring moment. In other words, any deviation from straight and level flight in either roll or yaw is exploited and the difference signal from the differential pressures activates the servo to effect or produce the necessary corrective action to null the signal. Author

N83-22207*# Systems Technology, Inc., Hawthorne, Calif.
FLIGHT DYNAMICS ANALYSIS AND SIMULATION OF HEAVY LIFT AIRSHIPS. VOLUME 1: EXECUTIVE SUMMARY Final Report, Sep. 1979 - Dec. 1982
Robert F. Ringland, Mark B. Tischler, Henry R. Jex, Roger D. Emmen, and Irving L. Ashkenas Dec. 1982 40 p refs 5 Vol.
(Contract NAS2-10330)
(NASA-CR-166471-Vol-1; NAS 1.26:166471-Vol-1; TR-1151-2-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 01C

A generic, yet comprehensive mathematical model and computer simulation of the HLA flight dynamics over its entire flight envelope was developed. Implicit in this simulation development are the data reviews and analyses which support the equations of motion and the calculation of forces and moments acting on the vehicle. The simulation, HYBRDS, is addressed to the broad

requirements and is intended for use as a synthesis and analysis tool for the evaluation of competing HLA design concepts. S.L.

N83-22208*# Systems Technology, Inc., Hawthorne, Calif.
FLIGHT DYNAMICS ANALYSIS AND SIMULATION OF HEAVY LIFT AIRSHIPS. VOLUME 2: TECHNICAL MANUAL Final Report, Sep. 1979 - Dec. 1982
Robert F. Ringland, Mark B. Tischler, Henry R. Jex, Roger D. Emmen, and Irving L. Ashkenas Dec. 1982 314 p refs 5 Vol.
(Contract NAS2-10330)
(NASA-CR-166471-Vol-2; NAS 1.26:166471-Vol-2; TR-1151-2-Vol-2) Avail: NTIS HC A14/MF A01 CSCL 01C

The mathematical models embodied in the simulation are described in considerable detail and with supporting evidence for the model forms chosen. In addition the trimming and linearization algorithms used in the simulation are described. Appendices to the manual identify reference material for estimating the needed coefficients for the input data and provide example simulation results. S.L.

N83-22209*# Systems Technology, Inc., Hawthorne, Calif.
FLIGHT DYNAMICS ANALYSIS AND SIMULATION OF HEAVY LIFT AIRSHIPS. VOLUME 3: USER'S MANUAL Final Report, Sep. 1979 - Dec. 1982
Roger D. Emmen and Mark B. Tischler Dec. 1982 91 p refs 5 Vol.
(Contract NAS2-10330)
(NASA-CR-166471-Vol-3; NAS 1.26:166471-Vol-3; TR-1151-2-Vol-3) Avail: NTIS HC A05/MF A01 CSCL 01C

The User's Manual provides the basic information necessary to run the programs. This includes descriptions of the various data files necessary for the program, the various outputs from the program and the options available to the user when executing the program. Additional data file information is contained in the three appendices to the manual. These appendices list all input variables and their permissible values, an example listing of these variables, and all output variables available to the user. Author

N83-22210*# Systems Technology, Inc., Hawthorne, Calif.
FLIGHT DYNAMICS ANALYSIS AND SIMULATION OF HEAVY LIFT AIRSHIPS, VOLUME 4. USER'S GUIDE: APPENDICES Final Report, Sep. 1979 - Dec. 1982
Roger D. Emmen and Mark B. Tischler Dec. 1982 234 p refs 5 Vol.
(Contract NAS2-10330)
(NASA-CR-166471-Vol-4; NAS 1.26:166471-Vol-4; TR-1151-2-Vol-4) Avail: NTIS HC A11/MF A01 CSCL 01C

This table contains all of the input variables to the three programs. The variables are arranged according to the name list groups in which they appear in the data files. The program name, subroutine name, definition and, where appropriate, a default input value and any restrictions are listed with each variable. The default input values are user supplied, not generated by the computer. These values remove a specific effect from the calculations, as explained in the table. The phrase 'not used' indicates that a variable is not used in the calculations and are for identification purposes only. The engineering symbol, where it exists, is listed to assist the user in correlating these inputs with the discussion in the Technical Manual. S.L.

N83-22211*# Systems Technology, Inc., Hawthorne, Calif.
FLIGHT DYNAMICS ANALYSIS AND SIMULATION OF HEAVY LIFT AIRSHIPS. VOLUME 5: PROGRAMMER'S MANUAL Final Report, Sep. 1979 - Dec. 1982
Robert F. Ringland, Mark B. Tischler, Henry R. Jex, Roger D. Emmen, and Irving L. Ashkenas Dec. 1982 152 p refs 5 Vol.
(Contract NAS2-10330)
(NASA-CR-166471-Vol-5; NAS 1.26:166471-Vol-5; TR-1151-2-Vol-5) Avail: NTIS HC A08/MF A01 CSCL 01C

The Programmer's Manual contains explanations of the logic embodied in the various program modules, a dictionary of program variables, a subroutine listing, subroutine/common block/cross reference listing, and a calling/called subroutine cross reference listing. S.L.

N83-22212*# Systems Technology, Inc., Mountain View, Calif.
ANALYSIS OF PILOT CONTROL STRATEGY Final Contractor Report, Feb. - Sep. 1982
Robert K. Heffley, Gregory D. Hanson, Wayne F. Jewell, and Warren F. Clement Apr. 1983 136 p refs
(Contract NAS4-2941)
(NASA-CR-170399; NAS 1.26:170399; TR-1188-2) Avail: NTIS HC A07/MF A01 CSCL 01C

Methods for nonintrusive identification of pilot control strategy and task execution dynamics are presented along with examples based on flight data. The specific analysis technique is Nonintrusive Parameter Identification Procedure (NIPIP), which is described in a companion user's guide (NASA CR-170398). Quantification of pilot control strategy and task execution dynamics is discussed in general terms followed by a more detailed description of how NIPIP can be applied. The examples are based on flight data obtained from the NASA F-8 digital fly by wire airplane. These examples involve various piloting tasks and control axes as well as a demonstration of how the dynamics of the aircraft itself are identified using NIPIP. Application of NIPIP to the AFTI/F-16 flight test program is discussed. Recommendations are made for flight test applications in general and refinement of NIPIP to include interactive computer graphics. Author

N83-22213*# Analytical Mechanics Associates, Inc., Hampton, Va.
TERMINAL AREA AUTOMATIC NAVIGATION, GUIDANCE AND CONTROL RESEARCH USING THE MICROWAVE LANDING SYSTEM (MLS). PART 5: DESIGN AND DEVELOPMENT OF A DIGITAL INTEGRATED AUTOMATIC LANDING SYSTEM (DIALS) FOR STEEP FINAL APPROACH USING MODERN CONTROL TECHNIQUES Final Report
Nesim Halyo Washington Apr. 1983 81 p refs
(Contract NAS1-15116)
(NASA-CR-3681; NAS 1.26:3681; Rept-8242-Pt-5) Avail: NTIS HC A05/MF A01 CSCL 01C

The design and development of a 3-D Digital Integrated Automatic Landing System (DIALS) for the Terminal Configured Vehicle (TCV) Research Aircraft, a B-737-100 is described. The system was designed using sampled data Linear Quadratic Gaussian (LQG) methods, resulting in a direct digital design with a modern control structure which consists of a Kalman filter followed by a control gain matrix, all operating at 10 Hz. DIALS uses Microwave Landing System (MLS) position, body-mounted accelerometers, as well as on-board sensors usually available on commercial aircraft, but does not use inertial platforms. The phases of the final approach considered are the localizer and glideslope capture which may be performed simultaneously, localizer and steep glideslope track or hold, crab/decrab and flare to touchdown. DIALS captures, tracks and flares from steep glideslopes ranging from 2.5 deg to 5.5 deg, selected prior to glideslope capture. Digital Integrated Automatic Landing System is the first modern control design automatic landing system successfully flight tested. The results of an initial nonlinear simulation are presented here. Author

N83-22214*# Lockheed-Georgia Co., Marietta.
SIMULATOR INVESTIGATION PLAN FOR DIGITAL FLIGHT CONTROLS VALIDATION TECHNOLOGY
D. B. Mulcare, W. G. Ness, and J. E. McCord Jul. 1982 187 p refs
(Contract NAS2-10270)
(NASA-CR-166427; NAS 1.26:166427; FAA-CT-21-161) Avail: NTIS HC A09/MF A01 CSCL 01C

Recommendations for real time simulation based research investigations designed to study validation methods for digital flight control systems (DFCS) are presented. These recommendations focus on utilization of the DFCS test bed established as a validation test facility. Twelve areas of investigation are broadly defined with the following six being specifically presented: (1) cross channel

synchronization; (2) sensor comparator dependability; (3) mode fault logic path determination; (4) multiple fault insertions; (5) revalidation of stability augmentation modifications; and (6) fault survivability of stability augmentation. S.L.

N83-22215# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
RECENT TRANSONIC FLUTTER INVESTIGATION FOR WINGS AND EXTERNAL STORES
Jan. 1983 66 p refs Meeting held in Toronto, Sep. 1982 (AGARD-R-703; ISBN-92-835-1443-2) Avail: NTIS HC A04/MF A01

Recent activities in the areas of aeroelasticity, subsonic flutter and transonic flutter are described. Results achieved in developing an adaptive flutter-suppression are described. Wind tunnel test results on aeroelastic wing models with external stores are discussed. For individual titles, see N83-22216 through N83-22219.

N83-22216# National Aeronautical Establishment, Ottawa (Ontario). High Speed Aerodynamics Lab.
A CANADIAN APPROACH TO FLUTTER CLEARANCE FOR EXTERNAL STORES
B. H. K. Lee and J. H. Goodey (Canadair Limited) *In* AGARD Recent Transonic Flutter Invest. for Wings and External Stores Jan. 1983 20 p refs (For primary document see N83-22215 12-08)
Avail: NTIS HC A04/MF A01

The Canadian capability in flutter clearance of military aircraft carrying underwing stores is reviewed. The flight test facilities and procedures, on-line analogue and post-flight digital data analysis, and analytical flutter model are described. Some results for the LAU-5003/A rocket launchers carrying C14 rockets armed with Mk I warheads are presented. Frequencies and damping values obtained from strip derivatives and doublet lattice aerodynamics methods used in the flutter computational code are discussed. Experimental results from on-line and post-flight analyses are compared for one aircraft/store configuration. Author

N83-22217# Messerschmidt-Boelkow G.m.b.H., Munich (West Germany). Unternehemensbereich Flugzeuge.
FLUTTER INVESTIGATIONS IN THE TRANSONIC FLOW REGIME FOR A FIGHTER TYPE AIRCRAFT
W. Luber and H. Schmid *In* AGARD Recent Transonic Flutter Invest. for Wings and External Stores Jan. 1983 14 p refs (For primary document see N83-22215 12-08)
Avail: NTIS HC A04/MF A01

A correction method for subsonic potential airforces especially for the transonic flow regime is proposed. The airforces are corrected by modifying the theoretical pressure coefficients locally with measured static pressure slopes. Trends of transonic airloads and moments with reduced frequency, Mach number and mean static incidence are given. The application of corrected airforces in flutter calculations is described, and its effect on flutter behavior is analyzed. It could be confirmed by analysis that the aerodynamic damping of the most important low-frequency vibration modes is reduced by aerodynamic transonic effects, which was indicated by flight flutter test results. Author

N83-22218*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLUTTER AND STEADY/UNSTEADY AERODYNAMIC CHARACTERISTICS OF SUPERCRITICAL AND CONVENTIONAL TRANSPORT WINGS
William F. Grosser (Lockheed-Georgia Co.), R. T. Britt (Lockheed-Georgia Co.), C. B. Childs (Lockheed-Georgia Co.), O. J. Crooks (Lockheed-Georgia Co.), and F. W. Cazier, Jr. *In* AGARD Recent Transonic Flutter Invest. for Wings and External Stores Jan. 1983 14 p refs (For primary document see N83-22215 12-08)
Avail: NTIS HC A04/MF A01 CSCL 01C

This paper presents the technical details and results of a high-speed wind-tunnel test program of an aeroelastic cantilevered transport type wing with two pylon-mounted engines. The tests were conducted in the NASA-Langley 16-foot Transonic Dynamic tunnel (TDT) during December 1981. Flutter of identical planforms, mass properties, and stiffness. The test parameters included different values of model stiffness and wing loading at various angles of attack. The models were instrumented at span-wise wing stations to determine bending and torsion deflections and vertical accelerations. At two model wing stations, pressure transducers were distributed along the chord to record static and unsteady oscillatory pressures during the approach to and onset of flutter. This paper presents the test program with results of the flutter characteristics and selected steady and unsteady aerodynamic data for both airfoils at different angles of attack for various Mach numbers and dynamic pressures. Author

N83-22219*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADAPTIVE FLUTTER SUPPRESSION, ANALYSIS AND TEST
E. H. Johnson (Northrop Corp.), C. Hwang (Northrop Corp.), D. S. Joshi (Northrop Corp.), C. A. Harvey (Honeywell, Inc.), L. T. Huttsell (AFWAL), and M. G. Farmer *In* AGARD Recent Transonic Flutter Invest. for Wings and External Stores Jan. 1983 12 p refs (For primary document see N83-22215 12-08)
Avail: NTIS HC A04/MF A01 CSCL 01C

Methods of adaptive control have been applied to suppress a potentially violent flutter condition of a half-span model of a lightweight figher aircraft. This marked the confluence of several technologies with active flutter suppression, digital control and adaptive control theory the primary contributors. The control algorithm was required to adapt both to slowly varying changes, corresponding to changes in the flight condition or fuel loading and to rapid changes, corresponding to a store release or the transition from a stable to an unstable flight condition. The development of the adaptive control methods was followed by a simulation and checkout of the complete system and a wind tunnel demonstration. As part of the test, a store was released from the model wing tip, transforming the model abruptly from a stable configuration to a violent flutter condition. The adaptive algorithm recognized the unstable nature of the resulting configuration and implemented a stabilizing control law in a fraction of a second. The algorithm was also shown to provide system stability over a range of wind tunnel Mach numbers and dynamic pressures. Author

N83-22094# *Systems Technology, Inc., Hawthorne, Calif.*
PROGRESS AND PITFALLS IN ADVANCED FLIGHT CONTROL SYSTEMS
Duane McRuer *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 17 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22095# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
DESIGNING IMPROVED TRACKING REGULATORS FOR PILOTING HIGHLY MANEUVERABLE AIRCRAFT [REALISATION DE REGULATEURS DE POURSOUTE AMELIORES POUR LE PILOTAGE DES AVIONS A GRANDE MASOEUVRABILITE]
Omer L. Mercier *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 13 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22096# *Salford Univ. (England).* Dept. of Aeronautical and Mechanical Engineering.
MICROPROCESSOR IMPLEMENTATION OF FAST-SAMPLING DIRECT DIGITAL FLIGHT-MODE CONTROLLERS
B. Porter, A. Bradshaw, A. Garis, and M. A. Woodhead *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 8 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22097# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer

Dynamik der Flugsysteme.
SYSTEMATIC COMPUTER AIDED CONTROL DESIGN
Georg Gruebel and Gerhard Kreisselmeier *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 7 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22098# Rome Univ. (Italy). School of Aerospace Engineering.
DIGITAL IMPLEMENTATION OF A LASER ACTIVE FLIGHT CONTROL SYSTEM WITH PROCESSED DECOUPLED STATES
Achille Danesi *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22101# Crouzet Aerospace and Systems, Valence (France).
ANEMOBAROMETRIC SYSTEMS FOR NEXT GENERATION AIRCRAFT [SYSTEMES ANEMOBAROMETRIQUES POUR AVIONS DE LA PROCHAINE GENERATION]
J. Mandle *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 9 p refs In FRENCH (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22105# Calspan Advanced Technology Center, Buffalo, N.Y.
FLIGHT CONTROL SYSTEM DESIGN USING ROBUST OUTPUT OBSERVERS
E. G. Rynaski *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 8 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22108# Northrop Corp., Hawthorne, Calif. Flight Control Research Dept.
DEVELOPMENT AND APPLICATION OF DIGITAL CONTROL FOR TACTICAL AIRCRAFT FLUTTER SUPPRESSION
Dinesh S. Joshi, Don F. Kesler, and Erwin H. Johnson *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 14 p refs (For primary document see N83-22093 12-01)
(Contract F33615-80-C-3217)
Avail: NTIS HC A11/MF A01

N83-22109*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA/RAE COLLABORATION ON NONLINEAR CONTROL USING THE F-8C DIGITAL FLY-BY-WIRE AIRCRAFT
G. F. Butler, M. J. Corbin, S. Mepham, J. F. Stewart, and R. R. Larson *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 17 p refs Prepared in cooperation with RAE, Farnsborough (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01 CSCL 01C

N83-22110# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Aircraft Div.
FLIGHT TEST EXPERIENCE WITH A DIGITAL INTEGRATED GUIDANCE AND CONTROL SYSTEM IN A CCV FIGHTER AIRCRAFT
U. Korte *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22111# Marconi Avionics Ltd., Rochester (England). Combat Aircraft Controls Div.
GROUND AND FLIGHT TESTING ON THE FLY-BY-WIRE JAGUAR EQUIPPED WITH A FULL TIME QUADRUPLEX DIGITAL INTEGRATED FLIGHT CONTROL SYSTEM
T. D. Smith, C. J. Yeo, and R. E. W. Marshall *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 20 p refs Sponsored in part by British Aerospace Aircraft Group, Preston, England (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22143# Marconi Avionics Ltd., Rochester (England). Flight Controls Div.
DISSIMILAR SOFTWARE IN HIGH INTEGRITY APPLICATIONS IN FLIGHT CONTROLS
David J. Martin *In* AGARD Software for Avionics Jan. 1983 13 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N83-22220# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
THE MAUNA LOA SOLAR OBSERVATORY AUTOMATIC DOME ROTATOR SYSTEM
E. Yasukawa Aug. 1982 10 p refs
(Grant NSF ATM-77-23757)
(PB83-134429; NCAR/TN-198) Avail: NTIS HC A02/MF A01 CSCL 13M

The schematic for a simple automatic dome rotation control for a solar observatory is described. This equipment is 16 foot dome on the island of Hawaii. GRA

N83-22221# National Academy of Sciences - National Research Council, Washington, D. C.
AN EVALUATIVE REPORT ON THE NATIONAL MEASUREMENT LABORATORY, NATIONAL BUREAU OF STANDARDS, FISCAL YEAR 1982 Final Report
Oct. 1982 140 p
(Contract NB82-SBCA-1505)
(PB83-132803) Avail: NTIS HC A07/MF A01 CSCL 14B

An evaluation of the technical functions and programs of the National Measurement Laboratory (NML) is presented. It represents the work of eleven Panels. One of the Panels is for the NML as a whole and performs an overview function for the National Research Council. The other ten Panels review specific activities within NML. This volume contains the full text of the reports of all eleven Panels. GRA

N83-22972# Joint Publications Research Service, Arlington, Va.
USE OF GEOCHEMICAL INVESTIGATIVE METHODS FOR PRELIMINARY HYGIENIC ASSESSMENT OF EFFECT OF AIRPORTS ON ENVIRONMENT
V. M. Kotlyar, L. N. Pavlova, and R. S. Smirnova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 13-16 Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 63-65 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N83-22222# Committee on Science and Technology (U. S. House).
NATIONAL SPACE POLICY
Washington GPO 1982 67 p Hearing before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 97th Congr., 2nd Sess., No. 143, 4 Aug. 1982
(GPO-99-176) Avail: Subcommittee on Space Science and Applications

The national space policy is reviewed. National security and

civilian program goals are stated. The role of the private sector and the importance of international cooperation are considered. Four space applications technologies are analyzed 'as a means to examine the more general issue of policy and goals'. For individual titles, see N83-22223 through N83-22225.

N83-22223# Committee on Science and Technology (U. S. House).
STATEMENT OF DR. GEORGE A. KEYWORTH, II, SCIENCE ADVISOR TO THE PRESIDENT AND DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY EXECUTIVE OFFICE OF THE PRESIDENT
In its National Space Policy 1982 p 13-32 Presented at the hearing before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 97th Congr., 2d Sess., No. 143, 4 Aug. 1982 (For primary document see N83-22222 12-12)
Avail: Subcommittee on Space Science and Applications

The national space policy is discussed. The Space Transportation System occupies a central position in the policy. A strong role for the private sector is encouraged, and continued use of space for national security is recommended. The importance of international cooperation is emphasized. S.L.

N83-22224# Committee on Science and Technology (U. S. House).
STATEMENT OF JAMES M. BEGGS, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its National Space Policy 1982 p 33-52 Presented at the hearing before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol, 97th Congr., 2d Sess., No. 143, 4 Aug. 1982 (For primary document see N83-22222 12-12)
Avail: Subcommittee on Space Science and Applications CSCL 22A

The national space policy provides a workable framework for an aggressive civilian program which permits continued progress in the exploration and exploitation of space. The importance of the civil space program is recognized, and is affirmed by the fundamental premise that the program be comprised of two separate, distinct interactive programs--national security and civil. The key objectives for NASA are presented. S.L.

N83-22225# Committee on Science and Technology (U. S. House).
STATEMENT OF DR. JOHN H. GIBBONS, DIRECTOR, OFFICE OF TECHNOLOGY ASSESSMENT
In its National Space Policy 1982 p 53-65 Presented at the hearing before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 97th Congr., 2d Sess., No. 143, 4 Aug. 1982 (For primary document see N83-22222 12-12)
Avail: Subcommittee on Space Science and Applications

The civilian space policy and applications were reviewed, and the major findings are summarized. The space policy is analyzed in view of the nation's critical needs in space. S.L.

N83-22226*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE TELECOMMUNICATIONS SYSTEMS ENGINEERING
Joseph H. Yuen, ed. Jul. 1982 612 p refs
(NASA-CR-170137; JPL-Publ-82-76; NAS 1.26:170137; LC-82-084114) Avail: NTIS HC A99/MF A01 CSCL 22A

Descriptive and analytical information useful for the optimal design, specification, and performance evaluation of deep space telecommunications systems is presented. Telemetry, tracking, and command systems, receiver design, spacecraft antennas, frequency selection, interference, and modulation techniques are addressed. For individual titles, see N83-22227 through N83-22238.

N83-22227*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELECOMMUNICATIONS SYSTEMS DESIGN **c32**
Joseph H. Yuen *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 1-22 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

The general configuration of deep space telecommunication systems is reviewed with regard to the design criteria necessary to insure the integrity of the system's telemetry, command, and tracking functions. The signal to noise spectral density ratios that characterize telecommunications performance are defined in terms of the link parameters. For design control, a statistical approach to predict link performance and to assess its uncertainty is described. M.G.

N83-22228*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPECIAL CHARACTERISTICS OF DIGITAL MODULATIONS **c32**
Marvin K. Simon *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 23-47 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

The importance of the bandwidth required for transmitting the chosen signaling or modulation technique in evaluating efficiency of a communication system is noted. The direct relation between bandwidth and the power spectral density (PSD) of the signaling scheme makes efficient analytical methods for calculating the PSD essential to specifying the spectral occupancy of the transmission channel. Several techniques for calculating the PSD of synchronous data pulse streams are reviewed. M.G.

N83-22229*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RECEIVER DESIGN AND PERFORMANCE CHARACTERISTICS **c32**
Marvin K. Simon and Joseph H. Yuen *In its* Deep Space Telcommun. Systems Eng. Jul. 1982 p 49-121 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 09C

The basic design, principles of operation, and characteristics of deep space communications receivers are examined. In particular, the basic fundamentals of phase-locked loop and Costas loop receivers used for synchronization, tracking, and demodulation of phase-coherent signals in residual carrier and suppressed carrier systems are addressed. M.G.

N83-22230*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIO TRACKING SYSTEM **c17**
Julian C. Breidenthal and Tomas A. Komarek *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 123-178 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 22A

The principles and techniques of deep space radio tracking are described along with the uses of tracking data in navigation and radio science. Emphasis is placed on the measurement functions of radio tracking. M.G.

N83-22231*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELEMETRY SYSTEM **c17**
Joseph H. Yuen, Dariush Divsalar, Peter W. Kinman, and Marvin K. Simon *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 179-341 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 09F

The means of telemetering digital data from a spacecraft to the Deep Space Network is addressed. Phase shift keying and uncoded quadriphase shift keying modulations are discussed along with demodulation and decoding systems. Telemetry system losses and noisy reference performance for suppressed carrier receivers are also examined. M.G.

N83-22232*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMMAND SYSTEM **c32**
Nathan A. Burow and Man K. Tam *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 343-381 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 17B

The Multimission Command (MMC) System is described. The major components within the MMC System are discussed, with the emphasis on the telecommunication-related implementations. Two versions of the spacecraft command detection system (the Viking heritage command detector and the NASA standard command detector) are discussed in detail. The former prevails in the existing flight projects and the latter will likely be adopted by the missions of the near future. The preparation of design control tables for the control of command link performance between deep space stations and the spacecraft is also discussed. M.G.

N83-2223J*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SPACECRAFT RADIO FREQUENCY SUBSYSTEM c32

Man K. Tam and Carroll F. Winn *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 383-412 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 17B

The historical background for the development of the planetary (RFS) is reviewed, and the performance capabilities of the various functional subassemblies are described. The flight radio frequency subsystem is a valid component for the three spacecraft telecommunications functions of tracking, command, and telemetry. It is the radio and the signal processing equipment residing in the spacecraft that interfaces with the control & data subsystem and performs two-way communications with the Earth-based Deep Space Network. The RFS consists of all the elements for RF reception, demodulation, modulation, and transmission, including those for command detection and telemetry modulation. M.G.

N83-22234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SPACECRAFT ANTENNAS c32

Yahya Rahmat-Samii and Gary K. Noreen *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 413-460 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 09C

A tutorial description is given for spacecraft antennas used for deep-space-to-Earth communication. Radiation pattern parameters, pointing errors, pointing and polarization loss, and noise characteristics are discussed. M.G.

N83-22235*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE PREDICTION OF WEATHER EFFECTS ON TELECOMMUNICATIONS LINK PERFORMANCE c32

Richard L. Horttor and Shlomo Dolinsky *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 461-490 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 20N

A theoretical model is described which combines the statistical description of communications link performance with a statistical description of weather effects. The Galileo communications link is used as an example. M.G.

N83-22236*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TELECOMMUNICATIONS PERFORMANCE ANALYSIS AND MONITORING SOFTWARE c32

Jim F. Taylor *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 491-516 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 17B

The computer software used for telecommunications performance analysis and monitoring is discussed. The utilization of the TPAP analysis program for the Viking 1975 project and the Voyager 1977 project is described. The functional and design requirements for the successor system, TPAS, are also given. M.G.

N83-22237*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RADIO FREQUENCY SELECTION AND INTERFERENCE PREVENTION c32

Norman F. deGroot *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 517-555 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 20N

The bands available for deep-space communications and the choice of particular mission frequencies are discussed. The more general susceptibility of deep-space Earth stations to various kinds of interference is then presented. An associated topic is the development of protection criteria that specify maximum allowable levels of interference. Next, the prediction of interference from near-Earth sateilites is described, with particular emphasis on the problems and uncertainties of such predictions. Finally, a brief description of other activities aimed at the prevention or avoidance of interference to deep-space radio communications is given. M.G.

N83-22238*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SPACE SHUTTLE AND TDRSS TELECOMMUNICATIONS SYSTEM INTERFACES c32

James C. Springett (Neocomm Systems, Inc.) and Peter W. Kinman *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 557-596 refs (For primary document see N83-22226 12-12)

Avail: NTIS HC A99/MF A01 CSCL 17B

The telecommunications system interfaces between the spacecraft and the space shuttle, and between the spacecraft and the Tracking and Data Relay Satellite System (TDRSS) are discussed. The payload/shuttle/ground communications network, principle end-to-end link configurations, and requirements for attached and detached payloads are addressed. M.G.

N83-22239# Joint Publications Research Service, Arlington, Va.

USSR REPORT: SPACE, NO. 20

28 Feb. 1983 156 p Transl. into ENGLISH from various Russian articles

(JPRS-82970) Avail: NTIS HC A08

Articles and abstracts addressing manned space flight, space sciences, space biology and medicine, space engineering and applications, and space policy and administration are presented. For individual titles, see N83-22240 through N83-22252.

N83-22240# Joint Publications Research Service, Arlington, Va.

CHRONOLOGY OF 'SALYUT-7' FLIGHT

In its USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 1-7 Transl. into ENGLISH from TASS reports (USSR), 1982 7 p (For primary document see N83-22239 12-12)

Avail: NTIS HC A08

Activities of the Salyut 7 cosmonauts are reported including Earth resources studies, biomedical experiments, space processing, and gamma radiation studies. The duration of the manned flight was 211 days. M.G.

N83-22241# Joint Publications Research Service, Arlington, Va.

DESCRIPTION, PHOTOS OF 'SALYUT-7' STATION c15

K. P. Feoktistov and E. K. Demchenko *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 8-16 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 6, Nov. - Dec. 1982 p 11-16 (For primary document see N83-22239 12-12)

Avail: NTIS HC A08

The instruments, life support systems, and working compartments of the Salyut 7 space station are described. Preflight preparation and launching and the research program for the space station are also discussed. M.G.

N83-22242# Joint Publications Research Service, Arlington, Va.

NEW FEATURES OF 'SALYUT-7' STATION c18

A. Aleksandrov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 17-20 Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 9, Sep. 1982 p 44-45 (For primary document see N83-22239 12-12)

Avail: NTIS HC A08

The modernization of design features of the Salyut 6 space station for implementation in the Salyut 7 is discussed. Solar panels,

navigation system, crew stations, research instrumentation, and life support equipment are addressed. M.G.

N83-22243# Joint Publications Research Service, Arlington, Va.
FIRST SOVIET-FRENCH MANNED FLIGHT
A. V. Filipchenko and V. A. Menshchikov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 21-26 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 3, May - Jun. 1982 p 12-16 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

The program for the joint Soviet-French manned spaceflight onboard the Salyut space station is described. It included astronomical and geophysical experiments and research in space technology, materials, medicine, and biology. Cosmonaut selection and training is also briefly discussed. M.G.

N83-22244# Joint Publications Research Service, Arlington, Va.
BIOMEDICAL AND TECHNICAL EXPERIMENTS IN FLIGHT OF SOVIET-FRENCH CREW
S. A. Nikitin *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 27-32 Transl. into ENGLISH from Priroda (Moscow), no. 9, Sep. 1982 p 6-9 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

The experimental program of the Soviet-French Salyut 7 mission is described. Experiments in the fields of space biology and medicine, astrophysics, and materials in space are discussed. M.G.

N83-22245# Joint Publications Research Service, Arlington, Va.
DELTA NAVIGATION SYSTEM ON 'SALYUT-7' **c17**
B. Konovalov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 33-34 Transl. into ENGLISH from Izvestiya (Moscow), 16 Jul. 1982 p 2 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

The control functions of the Delta navigation system are described. Station orientation, scientific instrument control, and communication system control are discussed. M.G.

N83-22246# Joint Publications Research Service, Arlington, Va.
COMMENTS ON 'SALYUT-7' COSMONAUTS EVA
A. Pokrovskiy *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 35-37 Transl. into ENGLISH from Pravda (Moscow), 31 Jul. 1982 p 1, 3 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

Cosmonaut extravehicular activity is briefly described along with the design of the semirigid type spacesuits used. Safety lines and medical monitoring equipment are also discussed. M.G.

N83-22247# Joint Publications Research Service, Arlington, Va.
RATIONALE FOR SELECTION OF FEMALE COSMONAUTS
V. Gubarev *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 39-42 Transl. into ENGLISH from Pravda (Moscow), 20 Aug. 1982 p 3 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

Topics discussed at the news conference with the three cosmonauts of the second Salyut-7 crew are reported. The scientific investigations conducted during the mission are addressed. M.G.

N83-22248# Joint Publications Research Service, Arlington, Va.
NEW ACHIEVEMENTS IN SPACE RESEARCH
In its USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 52-63 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 6, Nov. - Dec. 1982 p 4-10 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

Achievements of the Salyut-Soyuz space complex, the Venera 13 and 14 Venus probes, the development of a 70 m diameter radiotelescope, and the refining of the theory of planetary motion are addressed. M.G.

N83-22249# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SPACE MEDICINE **c52**
O. G. Gazenko and N. Panfilova *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 78-81 Transl. into ENGLISH from Meditsinskaya Gazeta (Moscow), 1 Oct. 1982 p 3 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

A brief history of the development of space biology and medicine is presented along with comments concerning the current state of knowledge. M.G.

N83-22250# Joint Publications Research Service, Arlington, Va.
BLOOD CIRCULATION IN WEIGHTLESSNESS **c52**
O. G. Gazenko and A. M. Genin *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 82-84 Transl. into ENGLISH from Zdorovye (Moscow), no. 4, Apr. 1982 p 10-11 Previously announced as A82-35700 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

The characteristics of blood circulation under conditions of weightlessness are discussed. The effects of normal gravity on the circulatory system are first considered with particular attention given to the gravitational distention of vascular walls and the necessary increase in blood volume to fill the expanded vessels. The absence of gravity is then shown to be accompanied by a contraction of the distended vessels in the lower extremities, the loss of the hydrostatic blood store and the shift of blood and intercellular fluids to the upper part of the body, resulting in an impairment in cerebral circulation, increased load on the right ventricle and an increased risk of pulmonary insufficiency. Mechanisms of decreasing circulating blood volume under weightless conditions are then examined. M.G.

N83-22251# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF TOOLS FOR WORK IN SPACE **c31**
A. Pokrovskiy *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 88-91 Transl. into ENGLISH from Pravda (Moscow), 19 Sep. 1982 p 6 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

Problems involved the use of electric and hand tools in space and the development of tools which overcome these problems are discussed. A recoilless hammer, a cutter, and a soldering gun are described. M.G.

N83-22252# Joint Publications Research Service, Arlington, Va.
EQUIPMENT FOR COSMONAUT EVA **c54**
G. G. Bebenin and Yu. N. Glazkov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 92-98 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 3, May - Jun. 1982 p 31-34 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

The design of an extravehicular movement pack comprised of a life support system, thermal regulation system, reaction motor, and orientation and stabilization system is described. Possible performance problems are also discussed. M.G.

N83-22260*# Stanford Univ., Calif.
DOCKING OF A RIGID SPACECRAFT WITH UNRESTRAINED ORBITING FLEXIBLE STRUCTURE
T. R. Kane *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 63-72 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22A

N83-22312*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STS-3 SNOWFLAKE STUDY
Jack Barengoltz, C. Maag, and F. Kuykendall *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 5 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22A

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N83-22253# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DEVELOPMENT OF EQUIPMENT FOR MEASURING SPACECRAFT DISTANCE M.S. Thesis [DESENVOLVIMENTO DE UM EQUIPAMENTO PARA MEDIDA DE DISTANCIA DE VEICULOS ESPACIAIS]
Celso Macedo deAndrade Mar. 1983 109 p refs In PORTUGUESE; ENGLISH summary
(INPE-2670-TDL/121) Avail: NTIS HC A06/MF A01

The development of ranging base-band equipment for utilization in low-altitude satellite orbit estimation is discussed. The equipment consists of two parts: transmission and reception. The first one consists basically of the ranging signal generation composed of 40, 160, 800, 4000, and 20000 Hz tones, according to NASA standard. This signal is ground originated and transmitted back by the spacecraft. The second part consists of the ranging estimator (receiver) whose performance is compared with that of an optimum estimator in the sense of the ranging-error variance. The estimator developed is based on second order phase locked loops that work as narrowband filters in order to capture the retransmitted tones. Phase-difference measurements are made among the corresponding transmitted and received tones which are combined in a microprocessor for ranging estimation. M.G.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N83-22254*# National Aeronautics and Space Administration. Goddard Space Flight Center, Albuquerque, N. Mex.
AN ATLAS OF NOVEMBER 1978 SYNTHETIC APERTURE RADAR DIGITIZED IMAGERY FOR OIL SPILL STUDIES
H. E. Maurer, W. Oderman (Computer Sciences Corp.), and W. F. Crosswell (Harris Corp.) Dec. 1982 106 p refs
(NASA-TM-84419; NAS 1.15:84419) Avail: NTIS HC A06/MF A01 CSCL 17I

A data set is described which consists of digitized synthetic aperture radar (SAR) imagery plus correlative data and some preliminary analysis results. This data set should be of value to experimenters who are interested in the SAR instrument and its application to the detection and monitoring of oil on water and other distributed targets. Author

N83-22255*# TRW, Inc., Redondo Beach, Calif. Space and Technology Group.
REQUIREMENTS FOR A MOBILE COMMUNICATIONS SATELLITE SYSTEM. PART 3: LARGE SPACE STRUCTURES MEASUREMENTS STUDY Final Report, 15 Dec. 1981 - 31 Mar. 1983
Wade Akle 31 Mar. 1983 114 p
(Contract NAS3-23257)
(NASA-CR-168105; NAS 1.26:168105) Avail: NTIS HC A06/MF A01 CSCL 22B

This study report defines a set of tests and measurements required to characterize the performance of a Large Space System (LSS), and to scale this data to other LSS satellites. Requirements from the Mobile Communication Satellite (MSAT) configurations derived in the parent study were used. MSAT utilizes a large, mesh deployable antenna, and encompasses a significant range of LSS technology issues in the areas of structural/dynamics, control, and performance predictability. In this study, performance requirements were developed for the antenna. Special emphasis was placed on antenna surface accuracy, and pointing stability. Instrumentation and measurement systems, applicable to LSS, were selected from existing or on-going technology developments. Laser ranging and angulation systems, presently in breadboard status, form the backbone of the measurements. Following this, a set of ground, STS, and GEO-operational were investigated. A third scale (15 meter) antenna system as selected for ground characterization followed by STS flight technology development. This selection ensures analytical scaling from ground-to-orbit, and size scaling. Other benefits are cost and ability to perform reasonable ground tests. Detail costing of the various tests and measurement systems were derived and are included in the report. Author

N83-22256*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL DYNAMICS AND CONTROL OF LARGE SPACE STRUCTURES, 1982
M. Larry Brumfield, comp. Washington Apr. 1983 261 p refs Workshop held in Hampton, Va., 21-22 Jan. 1982
(NASA-CP-2266; L-15579; NAS 1.55:2266) Avail: NTIS HC A12/MF A01 CSCL 22B

Basic research in the control of large space structures is discussed. Active damping and control of flexible beams, active stabilization of flexible antenna feed towers, spacecraft docking, and robust pointing control of large space platform payloads are among the topics discussed. R.J.F.

N83-22257*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE DAMPING OF A FLEXIBLE BEAM **c39**
Garnett C. Horner *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 1-8 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

The development of an algorithm that will determine actuator and sensor locations on a flexible beam is discussed. Large space structures will have many locations where actuators can be placed. This research seeks to determine the optimum locations. In addition, the best locations are determined while certain constraints are satisfied which guarantee that mission performance requirements are achieved. The approach adopted is to consider actuators and sensors to be collocated so as to produce an equivalent viscous damper. Ultimately, the experimental results of measuring the log decrement during free decay will correlate with the analytical predictions. R.J.F.

N83-22258*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DECOUPLING AND OBSERVATION THEORY APPLIED TO CONTROL OF A LONG FLEXIBLE BEAM IN ORBIT **c39**
Harold A. Hamer *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 9-38 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

Techniques which use decoupling theory and state variable feedback to control the pitch attitude and the flexible mode amplitudes of a long, thin beam are discussed. An observer based on the steady state Kalman filter was incorporated into the control

design procedure in order to estimate the values of the modal state variables required for the feedback control law. R.J.F.

N83-22259*# Stanford Univ., Calif.
ACTIVE STABILIZATION OF A FLEXIBLE ANTENNA FEED TOWER **c31**
Arthur E. Bryson, Jr. *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 39-58 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

Active stabilization logic is synthesized to hold a feed at the focus of a spacecraft antenna dish. The feed support structure is modeled as a tetrahedron made up of flexible bars and connected to the dish by six short legs containing force actuators. Using the symmetry of the structure, the model can be decomposed into four uncoupled subsystems: pitch/forward motions with four degrees of freedom (DOF) and two controls; roll/lateral motions with four DOF and two controls; vertical motions with three DOF and one control; and yaw motion with one DOF and one control. This greatly simplifies the synthesis of control logic. Author

N83-22260*# Stanford Univ., Calif.
DOCKING OF A RIGID SPACECRAFT WITH UNRESTRAINED ORBITING FLEXIBLE STRUCTURE **c12**
T. R. Kane *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 63-72 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22A

A methodology for producing simulations of the docking of a rigid spacecraft with any unrestrained flexible structure was studied. A detailed algorithm for the simulation of the docking of a rigid body with a nonuniform unrestrained beam was sought. The values acquired during docking by the variables characterizing the motions of the rigid body and the unrestrained beam were sought. R.J.F.

N83-22261*# Stanford Univ., Calif.
RESEARCH ON ELASTIC LARGE SPACE STRUCTURES AS 'PLANTS' FOR ACTIVE CONTROL
H. Ashley and A. vonFlotow *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 73-78 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Research on active control of large space structures is discussed. Intrinsic damping in monolithic metallic structures is discussed. Thermal relaxation and grain boundary relaxation are discussed, as are properties of thermal damping. R.J.F.

N83-22262*# Honeywell Systems and Research Center, Minneapolis, Minn.
IDENTIFICATION AND CONTROL OF SPACECRAFT **c18**
C. S. Greene and M. F. Barrett *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1982 p 79-90 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Information on the identification and control of spacecraft is given. Maximum likelihood estimation, identification accuracy issues, steady state identifiability analysis and stochastic error with process noise are among the topics addressed. R.J.F.

N83-22263*# Howard Univ., Washington, D. C.
THE DYNAMICS AND CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES **c18**
Peter M. Bainum, V. K. Kumar, R. Krishna, A. S. S. R. Reddy, and C. M. Diarra *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 91-110 ref (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Large, flexible orbiting systems proposed for possible use in communications, electronic orbital based mail systems, and solar energy collection are discussed. The size and low weight to area ratio of such systems indicate that system flexibility is now the main consideration in the dynamics and control problem. For such large, flexible systems, both orientation and surface shape control will often be required. A conceptual development plan of a system software capability for use in analysis of the dynamics and control of large space structures technology (LSST) systems is discussed. This concept can be subdivided into four different stages: (1) system dynamics; (2) structural dynamics; (3) application of control algorithms; and (4) simulation of environmental disturbances. Modeling the system dynamics of such systems in orbit is the most fundamental component. Solar radiation pressure effects and orbital and gravity gradient effects are discussed. R.J.F.

N83-22264*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
CONTROL OF STRUCTURES IN SPACE **c18**
L. Meirovitch and H. Barun *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 111-120 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Various topics related to the control of large space structures are discussed. Equations of motion for distributed systems, eigenvalue problems, modal equations, control implementation, and the Langley beam experiment are discussed. R.J.F.

N83-22265*# Old Dominion Univ., Norfolk, Va. Research Foundation.
ROBUST PRECISION POINTING CONTROL OF LARGE SPACE PLATFORM PAYLOADS **c18**
S. M. Joshi *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 121-134 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Large space structure (LSS) secondary controllers to enhance inherent damping, and primary controllers for controlling rigid-body modes and structural modes are discussed. It was concluded that LSS control is stable and robust and offers promise. Further investigation is needed on the effects of actuator/sensor bandwidth. R.J.F.

N83-22266*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NONLINEAR EFFECT ON MODAL DATA ANALYSIS METHOD **c39**
Lucas G. Horta *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 135-140 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

How the presence of nonlinearities in structural test data can be detected when using modern linear modal data analysis methods is discussed. The extent to which linear algorithms can provide useful information on nonlinear systems was discussed. The modal data analysis method successfully identified the frequency components (but not damping) of the true solution of a nonlinear systems. It was found that the approximate modal parameters of the linear system can be identified by the modal method when low levels of nonlinearities are present. The modal method successfully identified the modal parameters of a linear mode in the presence of a nonlinear response. R.J.F.

N83-22267*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL DESIGN FOR DYNAMIC RESPONSE REDUCTION **c39**
Brantley R. Hanks *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 141-150 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

A computer program for redesigning structural modes to reduce response has been initiated. The linear regulator approach in modal coordinates has been implemented. It is noted that the transformation of solution to physical structure is a major problem. It is concluded that the solution of stiffness equations and damping equations can be done separately as NXN set of (matrix Riccati) equations. B.W.

N83-22268*# City Univ. of New York, N. Y.
ALGORITHMS FOR ON-LINE PARAMETER AND MODE SHAPE ESTIMATION **c64**
Frederick E. Thau *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 151-160 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 12A

Algorithms are presented for on-line parameter and mode-shape estimation. The approach used is based upon a modal decomposition of the dynamic response of the flexible structure and is designed to make use of the parallel processing features of modern minicomputers. Satisfactory performance of the parallel structure identification technique used can be achieved only when the approximation functions noted correspond to the natural modes of the flexible structure. The work summarized here presents a technique for estimating both mode shapes and modal parameters. B.W.

N83-22269*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
COMPONENT NUMBER AND PLACEMENT IN LARGE SPACE STRUCTURE CONTROL **c18**
Wallace E. VanderVelde *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 161-174 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Studies are carried out to assist the designer of the control system for a large flexible space structure in his choice of how many actuators and sensors to incorporate in the system, and where to locate them on the structure. The degree of controllability and minimum control energy strategy for driving the system are described. B.W.

N83-22270*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
A PROGRAM PLAN FOR THE DEVELOPMENT OF FAULT TOLERANT LARGE SPACE SYSTEMS **c18**
Paul Motyka *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 175-180 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

The need for fault tolerance in Large Space systems is discussed. The unique characteristics of LSS which affect fault tolerance are described. The status of fault tolerant research for LSS is described. A program plan to validate and demonstrate the concept of fault tolerance for LSS is developed. B.W.

N83-22271*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
LARGE SPACE STRUCTURES CONTROL ALGORITHM CHARACTERIZATION **c64**
E. Fogel *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 181-194 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 12A

Feedback control algorithms are developed for sensor/actuator pairs on large space systems. These algorithms have been sized in terms of (1) floating point operation (FLOP) demands; (2) storage for variables; and (3) input/output data flow. FLOP sizing (per control cycle) was done as a function of the number of control states and the number of sensor/actuator pairs. Storage for variables and I/O sizing was done for specific structure examples. B.W.

N83-22272*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
PARTITIONING OF LARGE SPACE STRUCTURES VIBRATION CONTROL COMPUTATIONS **c18**
J. Kernan *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 195-200 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

The vibration control of large space structures is studied. It is found to be computationally demanding. Distribution of the vibration control computations among central and local processors can significantly reduce the throughput required from the central processor and may also result in improved performance due to reduced transport lag. B.W.

N83-22273*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
SHUTTLE FLIGHT CONTROL AND STRUCTURE INTERACTION **c16**
Michael Paluszek *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 201-214 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

A brief overview of the (DAP) Dynamic Autopilot is given. Results of the dynamic interaction study of the Orbiter with the General Dynamics Beam are presented. Preliminary results of the three degree of freedom payload parametric study are also presented. B.W.

N83-22274*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LARGE SPACE STRUCTURES CONTROLS RESEARCH AND DEVELOPMENT AT MARSHALL SPACE FLIGHT CENTER: STATUS AND FUTURE PLANS **c18**
H. Buchanan *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 215-220 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

Work performed in Large Space Structures Controls research and development program at Marshall Space Flight Center is described. Studies to develop a multilevel control approach which supports a modular or building block approach to the buildup of space platforms are discussed. A concept has been developed and tested in three-axis computer simulation utilizing a five-body model of a basic space platform module. Analytical efforts have continued to focus on extension of the basic theory and subsequent application. Consideration is also given to specifications to evaluate several algorithms for controlling the shape of Large Space Structures. B.W.

N83-22275*# Houston Univ., Tex. Dept. of Electrical Engineering.
RESEARCH ON THE CONTROL OF LARGE SPACE STRUCTURES **c18**
E. D. Denman *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 221-233 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

The research effort on the control of large space structures at the University of Houston has concentrated on the mathematical theory of finite-element models; identification of the mass, damping, and stiffness matrix; assignment of damping to structures; and decoupling of structure dynamics. The objective of the work has been and will continue to be the development of efficient numerical algorithms for analysis, control, and identification of large space structures. The major consideration in the development of the algorithms has been the large number of equations that must be handled by the algorithm as well as sensitivity of the algorithms to numerical errors. Author

N83-22276*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE CONTROL OF A FLEXIBLE BEAM **c39**
Jeffrey P. Williams *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 235-247 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

Because of inherent low damping and high flexibility, large space structures may require some form of active control of their dynamics. Because of the apparent inability to accurately model the dynamics of these structures, methods for parameter adaptive control are now being developed at Langley. This approach uses a digital computer to process discrete sensor data, identify modal parameters, calculate modal control gains, and then convert the modal forces to real forces. Some of the problems considered are: (1) the possibility that there may be modes to control with

limited amounts of hardware, and (2) the required accuracy of identified structural parameters. B.W.

N83-22277*# Virginia Univ., Charlottesville.
OPTIMAL DAMPING FOR A TWO-DIMENSIONAL STRUCTURE
c39
W. D. Pilkey and B. P. Wang *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 249-262 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

Criteria for selection of optimal damper locations are presented. A damping synthesis problem was formulated and applied to a NASA grillage model. B.W.

N83-22278*# RCA Astro-Electronics Div., Princeton, N. J.
THE TOPEX SATELLITE OPTION STUDY Final Report
28 May 1982 167 p refs Prepared for JPL
(Contract JPL-956198)
(NASA-CR-170210; NAS 1.26:170210; R-4402) Avail: NTIS HC A08/MF A01 CSCL 22B

The applicability of an existing spacecraft bus and subsystems to the requirements of ocean circulation measurements are assessed. The operational meteorological satellite family TIROS and DMSP are recommended. These programs utilize a common bus to satisfy their Earth observation missions. Note that although the instrument complements were different, the pointing accuracies were different, and, initially, the boosters were different, a high degree of commonality was achieved. S.L.

N83-22279*# Rockwell International Corp., Downey, Calif. Satellite Systems Div.
TECHNICAL DRAFT STUDY REPORT FOR TOPEX SATELLITE OPTIONS STUDY, VOLUME 1
11 Mar. 1981 192 p refs Prepared for JPL
(Contract JPL-956200)
(NASA-CR-170206; NAS 1.26:170206; SSD-82-0044-1-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 22B

The use of two spacecraft for adaptation to the TOPEX mission, namely the P80-1 and the GPS phase 2 are considered. The mission involved three mission options, each option varying in payload definition, payload weight, orbital altitude and payload power requirements. The P80-1 spacecraft is an Air Force Space Test Program satellite which carries a number of payloads to an orbital altitude of 400 n.mi. at a minimum inclination of 72.5 deg, and which has an orbital life capability of three years. The GPS phase 2 spacecraft is the operational satellite for the Global Positioning NAVSTAR navigation constellation provided for all service (and commercial) use. S.L.

N83-22280*# RCA Astro-Electronics Div., Princeton, N. J.
MARS GEOSCIENCE ORBITER AND LUNAR GEOSCIENCE ORBITER Final Report
William V. Fuldner and Paul F. Kaskiewicz 28 Jan. 1983 236 p refs Prepared for JPL
(Contracts NAS7-918; JPL-956291)
(NASA-CR-170211; NAS 1.26:170211; AE-R-4417) Avail: NTIS HC A11/MF A01 CSCL 22B

The feasibility of using the AE/DE Earth orbiting spacecraft design for the LGO and/or MGO missions was determined. Configurations were developed and subsystems analysis was carried out to optimize the suitability of the spacecraft to the missions. The primary conclusion is that the basic AE/DE spacecraft can readily be applied to the LGO mission with relatively minor, low risk modifications. The MGO mission poses a somewhat more complex problem, primarily due to the overall maneuvering hydrazine budget and power requirements of the sensors and their desired duty cycle. These considerations dictate a modification (scaling up) of the structure to support mission requirements. S.L.

N83-22281# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques and Spatiaux.
FUTURE LAUNCHING SYSTEMS. SECOND PROSPECTIVE PHASE: 1981-1982. TWO-LEVEL REUSABLE CRYOGENICS Final Report [SYSTEMES DE LANCEMENT FUTURS. SECONDE PHASE PROSPECTIVE: 1981-1982. BIETAGE CRYOGENIQUE REUTILISABLE]
P. Cormier and M. Villain Paris ESA 18 Jun. 1982 116 p refs In FRENCH
(Contract ESA-4811/81/F-FC)
(SYT/YL-23-283; ESA-CR(P)-1678) Avail: NTIS HC A06/MF A01

Conditions are discussed for staging a partially or fully reusable launch vehicle having a first stage with glide return and a second stage with ballistic reentry. Both stages use LOX-LHZ fuels and have identical motors. The mission objective is to insert into a 200 Km circular low orbit a payload with a minimum weight of 10 tons. The second stage has a propulsion system with storable fuel capable of putting the payload directly into a 200/800 orbit and of retransferring the empty second stage to a 200 Km circular orbit, deorbiting the second stage for reentry maneuver, and braking the second stage. Trajectories, kinematic conditions for separation, thermal protection, storage tank specifications, and refilling are examined as well as the possibility of payload retrieval. Transl. by A.R.H.

N83-22282# Raytheon Co., Huntsville, Ala. Life Cycle Analysis Group.
STORAGE RELIABILITY PREDICTION HANDBOOK FOR PARTS COUNT PREDICTION Final Report, Sep. 1980 - Sep. 1982
Harold B. Smith, Jr. and Claud A. Rhodes, Jr. Sep. 1982 93 p
(Contract DAAH01-80-D-0020; DA Proj. 1W3-63313-D-087)
(AD-A122439; AD-E950217; LC-82-1) Avail: NTIS HC A05/MF A01 CSCL 16/4

This report contains storage reliability failure rates on all categories of missile related hardware on piece part level. The published failure rates are the result of extensive analysis of data collected during nationwide data collection effort over a period of several years. The storage failure rates in this document are intended for use by service organizations and contractors for prediction purposes and as an aid in parts selection relative to newly developing weapons systems, by logisticians for planning purposes and for a variety of other purposes. It is planned by the US Army Missile Command to update the document periodically to keep it current and of maximum usefulness. GRA

N83-22283# Raytheon Co., Huntsville, Ala. Life Cycle Analysis Group.
STORAGE RELIABILITY ANALYSIS SUMMARY REPORT. VOLUME 2: ELECTRO MECHANICAL DEVICES Final Report, Sep. 1980 - Sep. 1982
Harold B. Smith, Jr. and Irvin L. Krulac Sep. 1982 83 p refs 5 Vol.
(Contract DAAH01-80-D-0020; DA Proj. 1W3-63313-D-087)
(AD-A122440; AD-E950317; LC-82-2-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 09/3

This document summarizes storage reliability data collected by the US Army Missile Command on electro-mechanical devices over a period of several years. Sources of data are detailed, major failure modes and mechanisms are listed and discussed. Non-operational failure rate prediction methodology is given, and conclusions and recommendations for enhancing the storage reliability of devices are drawn from the analysis of collected data. GRA

N83-22284# Raytheon Co., Huntsville, Ala. Life Cycle Analysis Group.
STORAGE RELIABILITY ANALYSIS SUMMARY REPORT. VOLUME 5: OPTICAL AND ELECTRO-OPTICAL DEVICES Final Report, Sep. 1980 - Sep. 1982
Harold B. Smith, Jr. and Irvin L. Krulac Sep. 1982 52 p refs 5 Vol.
(Contract DAAH01-80-D-0020; DA Proj. 1W3-36313-D-087)
(AD-A122441; AD-E950320; LC-82-2-Vol-5) Avail: NTIS HC A04/MF A01 CSCL 17/8

This document summarizes storage reliability data collected by the US Army Missile Command on optical and electro-optical

devices over a period of several years. Sources of data are detailed, major failure modes and mechanisms are listed and discussed. Non-operational failure rate prediction methodology is given, and conclusions and recommendations for enhancing the storage reliability of devices are drawn from the analysis of the collected data. GRA

N83-22285# Naval Ocean Systems Center, San Diego, Calif. Weapon Control and Sonar Dept.
DYNAMIC EQUATIONS FOR INITIALIZATION OF THE VERTICAL LAUNCH ASROC AUTOPILOT, REVISION
D. H. Lackowski Aug. 1982 25 p refs
(AD-A122600; NOSC/TR-742-Rev-1) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report defines the reference coordinate frames and provides the dynamic equations required to support development of autopilot initialization in the fire control computer for the Vertical Launch ASROC system. GRA

N83-22100# RCA Government Systems Div., Cherry Hill, N.J.
DESIGN AND SIMULATION OF AN INTELLIGENT MISSILE SEEKER
J. Hayman *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 15 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22241# Joint Publications Research Service, Arlington, Va.
DESCRIPTION, PHOTOS OF 'SALYUT-7' STATION
K. P. Feoktistov and E. K. Demchenko *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 8-16 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 6, Nov. - Dec. 1982 p 11-16 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-23012# Rand Afrikaans Univ., Johannesburg (South Africa). Dept. of Electrotechnical Cybernetics.
A DESIGN PROCEDURE FOR A MISSILE AUTOPILOT
J. A. Coetsee (Kentron Ltd.) and J. J. Krueger *In* NRIMS Symp. on Control Theory and Appl. 1982 17 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N83-22286*# OAO Corp., Greenbelt, Md.
SPACE TRANSPORTATION SYSTEM FLIGHT 2 OSTA-1 SCIENTIFIC PAYLOAD DATA MANAGEMENT PLAN
25 Sep. 1981 264 p refs
(Contract NASw-3358)
(NASA-CR-169826; NAS 1.26:169826; OTA/TR-81/0052) Avail: NTIS HC A12/MF A01 CSCL 22A

The Shuttle Imaging Radar-A (SIR-A), Shuttle Multispectral Infrared Radiometer (SMIRR), Future Identification and Location Experiment (FILE), Measurement of Air Pollution from Satellites (MAPS), Ocean Color Experiment (OCE), the Night/Day Optical Survey of Lightning (NOSL), and the Heflex Bioengineering Test (HBT) experiments are described. N.W.

N83-22287*# ECON, Inc., San Jose, Calif.
LIFE CYCLE COST ANALYSIS OF SHUTTLE-DERIVED LAUNCH VEHICLES, VOLUME 1 Final Report
Sep. 1982 140 p refs 2 Vol.
(Contract NAS9-16410)
(NASA-CR-171621; NAS 1.26:171621; MA-857T-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 22B

The design, performance, and programmatic definition of shuttle derived launch vehicles (SDLV) established by two different contractors were assessed and the relative life cycle costs of space transportation systems using the shuttle alone were compared with costs for a mix of shuttles and SDLV's. The ground rules and assumptions used in the evaluation are summarized and the work breakdown structure is included. Approaches used in deriving SDLV costs, including calibration factors and historical data are described. Both SDLV cost estimates and SDLV/STS cost comparisons are summarized. Standard formats are used to report comprehensive SDLV life cycle estimates. Hardware cost estimates (below subsystem level) obtained using the RCA PRICE 84 cost model are included along with other supporting data. A.R.H.

N83-22288*# ECON, Inc., San Jose, Calif.
LIFE CYCLE COST ANALYSIS OF SHUTTLE-DERIVED LAUNCH VEHICLES. VOLUME 2: EXECUTIVE SUMMARY Final Report
Sep. 1982 26 p refs 2 Vol.
(Contract NAS9-16410)
(NASA-CR-171622; NAS 1.26:171622; MA-857T) Avail: NTIS HC A03/MF A01 CSCL 22B

A digest of study approach and findings used at an oral briefing is presented. A.R.H.

N83-22289*# Systematics General Corp., Sterling, Va.
THE SHUTTLE ENVIRONMENT WORKSHOP Final Report
Jules Lehmann, Shelby G. Tanner, ed., and Tom Wilkerson, ed. Feb. 1983 327 p refs Workshop held in Calverton, Md., 5-7 Oct. 1982
(Contract NAS5-27362)
(NASA-CR-170496; NAS 1.26:170496; Rept-24-5087) Avail: NTIS HC A15/MF A01 CSCL 22B

Results of shuttle environmental measurement programs were presented. The implications for plasma, infrared and ultraviolet experiments were discussed. The prelaunch environmental conditions, results of key environmental measurements made during the flights of STS 1, 2, 3, 4, and postlanding environmental conditions were covered. For individual titles, see N83-22290 through N83-22312.

N83-22290*# Systematics General Corp., Sterling, Va.
THE SHUTTLE ENVIRONMENT WORKSHOP, EXECUTIVE SUMMARY AND WORKSHOP PROCEDURES
Jules Lehmann, Shelby G. Tanner, ed., and Tom Wilkerson, ed. *In its* The Shuttle Environ. Workshop Feb. 1982 p 1-7 (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

One of the main experimental monitors used to determine the environment in the payload bay was the Induced Environment Contamination Monitor. This package of instruments has made environmental measurements during STS flights with a high degree of success. This has shown that the shuttle environment is relatively free of contaminants, except for special instances of increased abundance of methane, water vapor and particulates. Results of these measurements are rapidly becoming more available. In establishing the Shuttle Environment Workshop, the findings were shared with scientific experimenters, users and other individuals who need to know what the Shuttle is like and what experimenters may expect in the payload bay. The Workshop was centered around results obtained from the environmental measurements made on the Shuttle. The program agenda for the workshop is given. The procedures and flow of communications for the workshop are indicated. S.L.

N83-22291*# Systematics General Corp., Sterling, Va.
ENVIRONMENTAL MEASUREMENTS SESSION SUMMARIES
Jules Lehmann, Shelby G. Tanner, ed., and Tom Wilkerson, ed. *In its* The Shuttle Environ. Workshop Feb. 1983 p 9-17 (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 13B

Emphasis was placed on data from payloads flown on the subject flights including results from the Induced Environment

Contamination monitor (IECM). Brief summaries of the vibroacoustics, loads, electromagnetic and thermal aspects of the environment, as derived from Shuttle system measurements, were presented primarily to indicate where the environment was different than observed and, therefore, where specification changes may be forthcoming. In addition, brief summaries of two somewhat unexpected effects, the vehicle glow and interaction between the low Earth environment and Shuttle payload by materials were presented as an aid in interpreting other environmental data. Papers for each payload/experiment involved in Shuttle flights were presented essentially in flight related chronological order. A significant portion of time was allocated for presentation of IECM data since this payload was flown on STS-2, STS-3, and STS-4 and, therefore, represents the largest data base relative to the contamination environment. Summaries of papers are presented. S.L.

N83-22292*# Systematics General Corp., Sterling, Va.
REPORT OF THE INFRARED, ULTRAVIOLET AND SPACE PLASMA PANELS
Jules Lehmann, Shelby G. Tanner, ed., and Tom Wilkerson, ed. *In its* The Shuttle Environ. Workshop Feb. 1983 p 19-29 (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 20F

The status of the payload bay and the needs of infrared, ultraviolet and space plasma experiments were discussed. Those measurements important in each area were reviewed. Issues of concern and how these environmental conditions might impact experiments were considered. Several common issues were revealed, and recommendations were made. S.L.

N83-22293*# Systematics General Corp., Sterling, Va.
FUTURE OUTLOOK AND COMMENTS
Jules Lehmann, Shelby G. Tanner, ed., and Tom Wilkerson, ed. *In its* The Shuttle Environ. Workshop Feb. 1983 p 31-39 (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22A

The events of the workshop panel sessions are summarized and a synopsis of the future of the shuttle and the shuttle environment is given. Comments and projections in a number of areas addressed include: environmental measurements, contamination effects, orbiter constraints on deployable payloads, documentation and environmental information, ultraviolet experiments, infrared experiments, plasma experiments, and shuttle lidar. S.L.

N83-22294*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INTRODUCTORY COMMENTS
Lubert J. Leger and Edgar R. Miller *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 6 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22A

Vibroacoustic and thermal environment data gathered from the first three flights of the space shuttle are presented. The characterization of the particulate, gaseous, and electromagnetic emissions associated with the shuttle flight is emphasized. Measurements of vehicle glow light emissions and material effects (mass loss) due to the low Earth environment interactions with the shuttle vehicle are presented. S.L.

N83-22295*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF EMI/EMC AND VIBROACOUSTICS
R. A. Colonna *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 18 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

The space shuttle payload bay environment data relating to vibroacoustics and electromagnetic effects are presented. Measurements were taken with low frequency accelerometers. Comparisons were made during ascent and descent. S.L.

N83-22296*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER CARGO BAY THERMAL ENVIRONMENT DATA
R. G. Brown *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 16 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

The orbiter cargo bay thermal environment data is presented. Measurements include: insulation surface temperatures, wire tray surface temperatures, sill longeron temperatures, gas temperatures, radiator temperatures, and gas pressure. S.L.

N83-22297*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
KSC SHUTTLE GROUND TURNAROUND EVALUATION
James M. Ragusa *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 21 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

Payload/mission development, processing flows, facilities/systems, and the various environments to which a payload is exposed during ground processing are described. These considerations are important for payload design and ground processing requirements development. S.L.

N83-22298*# Aerospace Corp., Los Angeles, Calif.
EVALUATION OF THE GROUND CONTAMINATION ENVIRONMENT FOR STS PAYLOADS
Eugene N. Borson *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 32 p refs (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 13B

The cleanliness and contamination control requirements for the shuttle program are reviewed. The objectives of the facility verification program are discussed. S.L.

N83-22299*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
OXYGEN ATOM REACTION WITH SHUTTLE MATERIALS AT ORBITAL ALTITUDES
Lubert J. Leger *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 22 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

Significant effects of the environment on payload bay materials observed on all flights are discussed. The STS 5 experiment is described. Increased outgassing rates resulting in possible localized effects on experiments, changes in optical control surfaces, and photoemission from reaction products are considered. S.L.

N83-22300*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INDUCED ENVIRONMENT CONTAMINATION MONITOR ASCENT/ENTRY, OPTICAL AND DEPOSITION MEASUREMENTS
Edgar R. Miller *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 15 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 13B

The induced environment contamination monitor is described. Optical and deposition measurements for ascent and descent are presented. S.L.

N83-22301*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
NEUTRAL GAS MASS SPECTROMETER ON THE IECM c35
G. R. Carignan *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 8 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

The neutral gas mass spectrometer on the Induced Environment Contamination Monitor is described. The results of the measurements are presented. S.L.

N83-22302*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

MODELING CORRELATION WITH FLIGHT DATA

Horst K. F. Ehlers *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 10 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 22A

The molecular contamination flow model (space 2 program) predicts the induced environment of the space shuttle orbiter/payload on orbit as well as the induced gas flow between the orbiter and payload surfaces. This computer program relates the input parameters which characterize the time dependent status of the orbiter/payload to the required output parameters. An application of the model to data from space transportation system flights 1, 2, and 3 shows that the model correlates well for direct flow and for return flux (STS-2/H2O). Correlation for return flux from other molecular sources/species appears to be within expectations but more analysis is required. The space 2 model seems to be an adequate predictive tool. A.R.H.

N83-22303*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EFFECTS OF SHUTTLE ENVIRONMENT ON INSTRUMENT PERFORMANCE **c19**

Andrew E. Potter *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 5 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 14B

Examination of the OSTA-1 payload instruments carried in the shuttle bay during the 54.25 hour mission of STS-2 indicates that the shuttle environment has no measurable effect on the Earth-viewing experiments. Operation of the payload shows that flight simulations are essential and experiment replanning practice is needed. Ground control of experiments is desirable since malfunctions of totally automated experiments cannot be fixed in flight. Alarm limits for experiments must be realistic since the crew loses interest after a few alarms. The quality and number of hours of data obtained for each experiment are listed. A.R.H.

N83-22304*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

OSS-1/CONTAMINATION MONITOR **c19**

Raymond Kruger, Jack Triolo, and R. McIntosh *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 16 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 14B

A 20-cm high, 18-cm wide, and 30-cm long (8x7x12 inch) box weighing about 7 kg (15 lbs) and consuming about 7 watts of power was carried on the OSS-1 pallet to monitor the mass build-up or accretion of condensible, volatile materials on surfaces in the shuttle bay during all phases of ascent, on-orbit, and descent. Passively thermally controlled, the box holds two witness samples and four actively temperature controlled quartz crystal microbalances (TQCM) whose temperature can vary from -60 C to +80 C. Graphs show the accretion indicated by the TQCM during the launch and early orbital phase. Conditions during tail to the Sun, nose to the Sun, and bay to the Sun attitudes of the shuttle during STS-3 are reflected in temperatures indicated by the OSS-1 thermistor. These temperatures influence outgassing rates of various materials as well as measurements made by the contamination monitor package. The parameters that bear on TQCM measurements data are shown in graphs and discussed. A.R.H.

N83-22305*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

TEST FOR CONTAMINATION OF MgF2 - COATED MIRRORS **c74**

Alan N. Bunner (Perkin-Elmer Corp.), John-David Bartoe (Naval Research Lab.), and Jack Triolo *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 7 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 20F

Graphs show preflight and postflight reflectivities in percent for exposed and covered mirrors carried on the OSS-1 payload pallet during STS-3. No changes greater than 1.8 sigma were observed except for a fingerprint. Weak evidence for degradation at 1216 A and 1600 A was found in several samples. There was no difference between flight mirrors and control mirrors. Covered samples suffered more than samples exposed to the Sun, but the differences are barely significant. The exposed side of the flight mirrors were somewhat dusty. No evidence was found for permanent solar-induced or shuttle-induced deterioration. There also was no evidence on oil-pumped vacuum versus oil-free vacuum during coating. A.R.H.

N83-22306*# Stanford Univ., Calif. Radioscience Lab.

VEHICLE CHARGING AND POTENTIAL ON THE STS-3 MISSION

Roger Williamson *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 19 p (For primary document see N83-22289 12-16)

(Contract NAS5-24455; Grant NAGw-235)

Avail: NTIS HC A15/MF A01 CSCL 22B

An electron gun with fast pulse capability was used in the vehicle charging and potential experiment carried on the OSS-1 pallet to study dielectric charging, return current mechanisms, and the techniques required to manage the electrical charging of the orbiter. Return currents and charging of the dielectrics were measured during electron beam emission and plasma characteristics in the payload bay were determined in the absence of electron beam emission. The fast pulse electron generator, charge current probes, spherical retarding potential analyzer, and the digital control interface unit which comprise the experiment are described. Results show that the thrusters produce disturbances which are variable in character and magnitude. Strong ram/wake effects were seen in the ion densities in the bay. Vehicle potentials are variable with respect to the plasma and depend upon location on the vehicle relative to the main engine nozzles, the vehicle attitude, and the direction of the geomagnetic field. A.R.H.

N83-22307*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.

STS-3/OSS-1 PLASMA DIAGNOSTICS PACKAGE (PDP) MEASUREMENTS OF THE TEMPERATURE PRESSURE AND PLASMA

Stanley D. Shawhan and Jerry Murphy *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 25 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 14B

Designed to withstand the thermal extremes of the STS-3 mission through the use of heaters and thermal blankets, the plasma diagnostics package sat on the release/engagement mechanism on the OSS-1 payload pallet without a coldplate and was attached to the RMS for two extended periods. Plots show temperature versus mission elapsed time for two temperature sensors. Pressure in the range of 10 to the -3 power torr and 10 to the -7 power torr, measured 3 inches from the skin of the package is plotted against GMT during the mission. The most distinctive feature of the pressure profile is the modulation at the obit period. It was found that pressure peaks when the atmospheric gas is rammed into the cargo bay. Electric and magnetic noise spectra and time variability due to orbiter systems, UHF and S-band transmitter field strengths, and measurements of the ion spectra obtained both in the cargo bay and during experiments are plotted. A.R.H.

N83-22308*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.

STS-3/OSS-1 PLASMA DIAGNOSTICS PACKAGE (PDP) MEASUREMENTS OF ORBITER TRANSMITTER AND SUBSYSTEM ELECTROMAGNETIC INTERFERENCE **c32**

Stanley D. Shawhan and Jerry Murphy *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 17 p (For primary document see N83-22289 12-16)

Avail: NTIS HC A15/MF A01 CSCL 09C

The plasma diagnostics package receiver system is described to identify the various antennas and to characterize the complement of receivers which cover the frequency range of 30 Hz to 800 Hz and S-band at 2200 + or - 300 MHz. Sample results are presented to show the variability of electromagnetic effects associated with the orbiter and the time variability of these effects. The electric field and magnetic field maximum and minimum field strength spectra observed during the mission at the pallet location are plotted. Values are also derived for the maximum UHF transmitter and S-band transmitter field strengths. Calibration data to convert from the survey plots to actual narrowband and broadband field strengths are listed. Author

N83-22309*# Florida Univ., Gainesville. Space Astronomy Lab.
OSS-1/STS-3 SHUTTLE INDUCED ATMOSPHERE EXPERIMENT
Jerry L. Weinberg, F. Giovane, D. W. Schuerman, and R. C. Hahn *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 15 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

Direct light form the Sun and the sunlit Earth, and indirect light from these same sources reflected off parts of the orbiter and its payload were the two major sources of light seen in the bay during spacecraft day. Brightness arising from sunlight reflected off particulates originating from the spacecraft (corona or induced atmosphere) were tentatively identified. Sources of light observed during spacecraft night include large scale diffuse glows associated with Vernier thruster firings, surface glows on the orbiter in the direction of orbiter n motion, and periodic sky brightness structures observed primarily at 4200 A and 6300 A. Some information was obtained on the size and trajectories of individual contaminant particulates. Astronomical data were obtained from large regions of the Milky Way and zodiacal light, including large regions to within 35 deg of the Sun and possibly closer. Coordinated and sometimes simultaneous observations were successfully made from Hawaii and from STS-3 to provide unique information on atmospheric sources and sinks of radiation. A.R.H.

N83-22310*# Naval Research Lab., Washington, D. C.
SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR EXPERIMENT ON OSS-1 **c19**
M. E. VanHossier *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 7 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

The need to improve the accuracy of measurement of the absolute solar flux within the wavelength range 120 nm to 400 nm requires an extensive effort in contamination control and in tracking the instruments' stability. The techniques used in the solar ultraviolet irradiance monitor are described. These methods resulted in very high calibration stability as proved by preflight and postflight calibration. In-flight calibrating and the pointing accuracy provided by the shuttle attitude control system are discussed. Author

N83-22311*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RESULTS OF THERMAL ENVIRONMENT MEASUREMENTS ON THE THERMAL CANNISTER EXPERIMENT AND GET AWAY SPECIAL ENCLOSURE
Stanford Ollendorf and Daniel Butler *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 12 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22B

Because the OSS-1 pallet contained a variety of instruments with irregular surface geometry and properties which limited predictability, the total absorbed flux on thermal canister radiators was measured to determine heat rejection capability. The instrumentation and sensor cup design and locations for the thermal canister experiment are illustrated. Graphs show flux sensor history in hot and coal orbits. Kapton erosion is also considered. Results show that the flux levels measured in all STS attitudes are higher than predictions. In cold and moderate attitudes, flight results are a factor of two to three higher than predicts. In hot attitude, much better agreement occurred. It is concluded that in cold or moderate attitudes other sources may be contributing to added inputs (albedo, Earth shine, shuttle background). In hot attitude, smaller differences could be attributed to coatings assumptions or calculation uncertainty. A.R.H.

N83-22312*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STS-3 SNOWFLAKE STUDY **c12**
Jack Barengoltz, C. Maag, and F. Kuykendall *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 5 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 22A

Videotape recordings were made of particles observed being released from the orbiter and image processing techniques were used to reduce the data in order to obtain sources and sizes. Results show that a significant number of 1 mm to 1 cm diameter particles were in the vicinity of STS-3. Their origin may be near the aft end of the orbiter; however, 19 of the 33 examined trajectories show that the origin was definitely forward of the aft end of the bay. There may be larger particles near the aft end of the orbiter. Most particles move generally rearward with respect to the orbiter (+X direction). A.R.H.

N83-22273*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
SHUTTLE FLIGHT CONTROL AND STRUCTURE INTERACTION
Michael Paluszek *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 201-214 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N83-22313*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF MMIC MODULES IN FUTURE MULTIPLE BEAM SATELLITE ANTENNA SYSTEMS
Jerry Smetana 1982 14 p refs Presented at the 1982 Antenna Appl. Symp., Monticello, Illinois, 22-24 Sep. 1982; sponsored by Rome Air Development Center and Illinois Univ.
(NASA-TM-83344; E-1598; NAS 1.15:83344) Avail: NTIS HC A02/MF A01 CSCL 17B

Multiple beam antenna systems for advanced communication satellites operating in the 30/20 GHz frequency bands (30 GHz uplink, 20 GHz downlink) were developed. Up to twenty 0.3 deg HPBW fixed spot beams and six 0.3 deg HPBW scanning spot beams will be required. Array-fed dual reflector antenna systems in which monolithic microwave integrated circuit (MMIC) phase shift and amplifier modules are used with each radiating element of the feed array for beam pointing and power gain were developed. The feasibility of distributed power amplification and beam pointing with MMIC modules in the elements of an array and to develop a data base for future development were demonstrated. The technical discussion centers around the potential advantages of "monolithic" antennas for specific applications as compared to systems using high powered TWT's. These include: reduced losses in the beam forming network; advantage of space combining and graceful degradation; dynamic control of beam pointing and illumination contour; and possibilities for cost and weight reduction. B.G.

N83-22245# Joint Publications Research Service, Arlington, Va.
DELTA NAVIGATION SYSTEM ON 'SALYUT-7'
B. Konovalov *In its* USSR Rept.: Space, No. 20 (JPRS-82970)

28 Feb. 1983 p 33-34 Transl. into ENGLISH from Izvestiya (Moscow), 16 Jul. 1982 p 2 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22230*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIO TRACKING SYSTEM
Julian C. Breidenthal and Tomas A. Komarek *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 123-178 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 22A

N83-22231*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELEMETRY SYSTEM
Joseph H. Yuen, Dariush Divsalar, Peter W. Kinman, and Marvin K. Simon *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 179-341 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N83-22314*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUPPORTING FLIGHT DATA ANALYSIS FOR SPACE SHUTTLE ORBITER EXPERIMENTS AT NASA AMES RESEARCH CENTER
Michael J. Green, Mari P. Budnick (Informatics General Corp., Palo Alto, Calif.), Lily Yang (Informatics General Corp., Palo Alto, Calif.), and Matthew P. Chiasson (Foothill Coll.) Apr. 1983 14 p refs
(NASA-TM-84345; A-9289; NAS 1.15:84345) Avail: NTIS HC A02/MF A01 CSCL 22B

The space shuttle orbiter experiments program is responsible for collecting flight data to extend the research and technology base for future aerospace vehicle design. The infrared imagery of shuttle (IRIS), catalytic surface effects, and tile gap heating experiments sponsored by Ames Research Center are part of this program. The software required to process the flight data which support these experiments is described. In addition, data analysis techniques, developed in support of the IRIS experiment, are discussed. Using the flight data base, the techniques provide information useful in analyzing and correcting problems with the experiment, and in interpreting the IRIS image obtained during the entry of the third shuttle mission. Author

N83-22315*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATTITUDE CONTROL AND DRAG COMPENSATION PROPULSION SYSTEM FOR GRAVITY PROBE-B SPACECRAFT
D. H. Blount Jan. 1983 38 p refs
(NASA-TM-82517; NAS 1.15:82517) Avail: NTIS HC A03/MF A01 CSCL 22B

An on board propulsion system for attitude control and drag compensation is presented which uses helium boiloff gas from an experiment package dewar as propellant. This boiloff gas would normally be vented nonpropulsively. Use of a small allowable temperature range in the dewar is exploited to store helium and accommodate incompatibilities in dewar heat leak and thruster demand flow over periods of more than one orbit. A relatively detailed thermodynamics analysis of the two phase helium dewar and simulation of pressure loss through the helium distribution system is included. Author

N83-22316*# Lockheed Missiles and Space Co., Palo Alto, Calif.
PASSIVE ORBITAL DISCONNECT STRUT (PODS 3), STRUCTURAL AND THERMAL TEST PROGRAM
R. T. Parmley Mar. 1983 79 p refs
(Contract NAS2-10848)
(NASA-CR-166473; NAS 1.26:166473) Avail: NTIS HC A05/MF A01 CSCL 22B

A test program is undertaken to verify that the lifetime of a shuttle launchable dewar can be increased by using passive orbital disconnect struts (PODS). A detailed design is performed on the cold end (PODS-III) portion of the strut. Structural analysis of the thin-wall fiberglass tube allows selection of the optimum winding angle and tube dimensions. Structural tests on the thin-wall fiberglass tube measure both the tension and compression modulus at ambient and LN2 temperatures, the radial deflection versus side load, and the ultimate compression strength of the tube at LN2 temperature. The thermal expansion of the fiberglass tube plus Invar is also measured down to 78 K. The axial gap at the wedge portion of the stem is set based on these data. The PODS-III test article parts are fabricated and assembled using a detailed assembly procedure. The thermal conductants in the orbital configuration was measured for body temperatures between 5 and 40 K. This temperature range covers the predicted ground hold and orbit temperatures for vapor-cooled supports. The test results are then compared with heat leak values predicted before the test began. Side load, axial compression load, and tension load tests conclude the test program. Author

N83-22317*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERFORMANCE OF AN ABLATOR FOR SPACE SHUTTLE INORBIT REPAIR IN AN ARC-PLASMA AIRSTREAM
David A. Stewart, Melanie Cuellar (San Jose State Univ.), and Orvel Flowers Apr. 1983 18 p refs
(NASA-TP-2150; A-9112; NAS 1.60:2150) Avail: NTIS HC A02/MF A01 CSCL 22B

An ablator patch material performed well in an arc plasma environment simulating nominal Earth entry conditions for the Space Shuttle. Ablation tests using vacuum molded cones provided data to optimize the formulation of a two part polymer system for application under space conditions. The blunt cones were made using a Teflon mold and a state of the art caulking gun. Char stability of formulations with various amounts of catalyst and diluent were investigated. The char was found to be unstable in formulations with low amounts of catalyst and high amounts of diluent. The best polymer system determined by these tests was evaluated using a half tile patch in a multiple High Temperature Reusable surface Insulation tile model. It was demonstrated that this ablator could be applied in a space environment using a state of the art caulking gun, would maintain the outer mold line of the thermal protection system during entry, and would keep the bond line temperature at the aluminum tile interface below the design limit. Author

N83-22242# Joint Publications Research Service, Arlington, Va.
NEW FEATURES OF 'SALYUT-7' STATION
A. Aleksandrov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 17-20 Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 9, Sep. 1982 p 44-45 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22262*# Honeywell Systems and Research Center, Minneapolis, Minn.
IDENTIFICATION AND CONTROL OF SPACECRAFT
C. S. Greene and M. F. Barrett *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1982 p 79-90 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22263*# Howard Univ., Washington, D. C.
THE DYNAMICS AND CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES
Peter M. Bainum, V. K. Kumar, R. Krishna, A. S. S. R. Reddy, and C. M. Diarra *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 91-110 ref (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22264*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
CONTROL OF STRUCTURES IN SPACE
L. Meirovitch and H. Barun *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 111-120 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22265*# Old Dominion Univ., Norfolk, Va. Research Foundation.
ROBUST PRECISION POINTING CONTROL OF LARGE SPACE PLATFORM PAYLOADS
S. M. Joshi *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 121-134 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22269*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
COMPONENT NUMBER AND PLACEMENT IN LARGE SPACE STRUCTURE CONTROL
Wallace E. VanderVelde *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 161-174 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22270*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
A PROGRAM PLAN FOR THE DEVELOPMENT OF FAULT TOLERANT LARGE SPACE SYSTEMS
Paul Motyka *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 175-180 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22272*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
PARTITIONING OF LARGE SPACE STRUCTURES VIBRATION CONTROL COMPUTATIONS
J. Kernan *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 195-200 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22274*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LARGE SPACE STRUCTURES CONTROLS RESEARCH AND DEVELOPMENT AT MARSHALL SPACE FLIGHT CENTER: STATUS AND FUTURE PLANS
H. Buchanan *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 215-220 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

N83-22275*# Houston Univ., Tex. Dept. of Electrical Engineering.
RESEARCH ON THE CONTROL OF LARGE SPACE STRUCTURES
E. D. Denman *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 221-233 refs (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N83-22303*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTS OF SHUTTLE ENVIRONMENT ON INSTRUMENT PERFORMANCE
Andrew E. Potter *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 5 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

N83-22304*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OSS-1/CONTAMINATION MONITOR
Raymond Kruger, Jack Triolo, and R. McIntosh *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 16 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

N83-22310*# Naval Research Lab., Washington, D. C.
SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR EXPERIMENT ON OSS-1
M. E. VanHossier *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 7 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N83-22318*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN, FABRICATION AND TESTING OF POROUS TUNGSTEN VAPORIZERS FOR MERCURY ION THRUSTERS
Ralph Zavesky, Erich Kroeger, and Seiji Kami (Hughes Research Labs., Malibu, Calif.) Feb. 1983 62 p refs
(NASA-TM-83063; E-1534; NAS 1.15:83063) Avail: NTIS HC A04/MF A01 CSCL 21C

The dispersions in the characteristics, performance and reliability of vaporizers for early model 30-cm thrusters were investigated. The purpose of the paper is to explore the findings and to discuss the approaches that were taken to reduce the observed dispersion and present the results of a program which validated those approaches. The information that is presented includes porous tungsten materials specifications, a discussion of assembly procedures, and a description of a test program which screens both material and fabrication processes. There are five appendices providing additional detail in the areas of vaporizer contamination, nitrogen flow testing, bubble testing, porosimeter testing, and mercury purity. Four neutralizers, seven cathodes and five main vaporizers were successfully fabricated, tested, and operated on thrusters. Performance data from those devices is presented and indicates extremely repeatable results from using the design and fabrication procedures. Author

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N83-22319*# Massachusetts Inst. of Tech., Cambridge. Materials Processing Center.

THE MATERIALS PROCESSING RESEARCH BASE OF THE MATERIALS PROCESSING CENTER. REPORT FOR FY 1982
Annual Report, 1 Oct. 1981 - 30 Sep. 1982
Merton C. Flemings 14 Apr. 1983 305 p refs
(Grant NsG-7645)
(NASA-CR-170174; NAS 1.26:170174) Avail: NTIS HC A14/MF A01 CSCL 05A

The work described, while involving research in the broad field of materials processing, has two common features: the problems are closed related to space precessing of materials and have both practical and fundamental significance. An interesting and important feature of many of the projects is that the interdisciplinary nature of the problem mandates complementary analytical modeling/experimental approaches. An other important aspect of many of the projects is the increasing use of mathematical modeling techniques as one of the research tools. The predictive capability of these models, when tested against measurements, plays a very important role in both the planning of experimental programs and in the rational interpretation of the results. Many of the projects described have a space experiment as their ultimate objective. Mathematical models are proving to be extremely valuable in projecting the findings of ground - based experiments to microgravity conditions. S.L.

N83-22320*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE RESISTANT FILMS FOR AIRCRAFT APPLICATIONS
Demetrius A. Kourtides Mar. 1983 36 p refs Presented at the 8th Intern. Conf. on Fire Safety, Millbrae, Calif., 17-21 Jan. 1983
(NASA-TM-84337; A-9218; NAS 1.15:84337) Avail: NTIS HC A03/MF A01 CSCL 01C

Alternative sandwich panel decorative films were investigated as replacements for the polyvinyl fluoride currently used in aircraft interiors. Candidate films were studied for flammability, smoke emission, toxic gas emission, flame spread, and suitability as a printing surface for the decorative acrylic ink system. Several of the candidate films tested were flame modified polyvinyl fluoride, polyvinylidene fluoride, polyimide, polyamide, polysulfone, polyphenylsulfone, polyethersulfone, polybenzimidazole, polycarbonate, polyparabanic acid, polyphosphazene, polyetheretherketon, and polyester. The films were evaluated as pure films only, films silk-screened with an acrylic ink, and films adhered to a phenolic fiberglass substrate. Films which exhibited the highest fire resistant properties included PEEK polyetheretherketon, Aramid polyamide, and ISO-BPE polyester. Author

N83-22321# Mound Lab., Miamisburg, Ohio.
SYNTHESIS OF ORGANIC GEOCHEMICAL DATA FROM THE EASTERN GAS SHALES
R. E. Zielinski and R. D. McIver 1982 16 p refs Presented at the Unconventional Gas Recovery Symp., Pittsburgh, 16 May 1982
(Contract DE-AC04-76DP-00053)
(DE82-009969; MLM-2917; CONF-820524-6) Avail: NTIS HC A02/MF A01

Over 2400 core and cuttings samples of Upper Devonian shales from wells in the Appalachian, Illinois, and Michigan Basins were characterized by organic geochemical methods to provide a basis for accelerating the exploitation of this unconventional, gas rich resource. Industry was provided with criteria for locating the best areas for drilling and for the development of stimulation methods that will make recovery of the resource economically attractive. The geochemical assessment shows that the shale, in much of the Appalachian, Illinois, and Michigan Basins is source rock that is capable of generating enormous quantities of gas. In some areas the shales are also capable of generating large quantities of oil as well. The limiting factors preventing these sources from realizing most of their potential are their very low permeabilities and the paucity of potential reservoir rocks. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N83-22322# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
ADVANTAGES AND DISADVANTAGES OF CARBON SHEETS AND CLOTH. TECHNICAL AND ECONOMIC BALANCE [AVANTAGES ET INCONVENIENTS DE L'EMPLOI DES NAPPES ET DES TISSUS CARBONES. BILAN TECHNIQUE ET ECONOMIQUE]
G. Briens and G. Hilaire 4 Jan. 1983 18 p In FRENCH Presented at SAMPE European Conf., London, 14-16 Mar. 1983
(SNIAS-822-551-103; DCQ/L-C-44.872-GB/CB) Avail: NTIS HC A02/MF A01

Because the costs of carbon sheets at the impregnation stage, and of carbon cloth is nearly the same in France, it is necessary to look elsewhere for reasons for validating the choice of sheets or cloth for aeronautical structures. At the performance level, sheets are generally superior to cloth and should be chosen in cases where the optimization of dimensions and of mass estimates are imposed. On the contrary, it is undeniable that, for certain specific applications, cloth should be retained; replacing two ultrathin crossed cloths that are difficult to maneuver, fabricating performated acoustic walls, and constructing complex forms. Sheets and cloths should be considered as complementary and not as interchangeable. Transl. by A.R.H.

N83-22323*# Ciba-Geigy Corp., Ardsley, N.Y. Resins Dept.
EPOXY HYDANTOINS AS MATRIX RESINS
Jonas Weiss Mar. 1983 18 p refs
(Contract NAS1-16551)
(NASA-CR-166024; NAS 1.26:166024) Avail: NTIS HC A02/MF A01 CSCL 11D

Tensile strength and fracture toughness of castings of the hydantoin resins cured with methylenedianiline are significantly higher than MY 720 control castings. Water absorption of an ethyl, amyl hydantoin formulation is 2.1 percent at equilibrium and Tg's are about 160 C, approximately 15 deg below the final cure temperature. Two series of urethane and ester-extended hydantoin epoxy resins were synthesized to determine the effect of crosslink density and functional groups on properties. Castings cured with methylenedianiline or with hexahydrophthalic anhydride were made from these compounds and evaluated. The glass transition temperatures, tensile strengths and moduli, and fracture toughness values were all much lower than that of the simple hydantoin epoxy resins. Using a methylene bishydantoin epoxy with a more rigid structure gave brittle, low-energy fractures, while a more flexible, ethoxy-extended hydantoin epoxy resin gave a very low Tg. A.R.H.

N83-22324*# Boeing Aerospace Co., Seattle, Wash.
A PROPOSED APPROACH TO THE APPLICATION OF NONLINEAR IRREVERSIBLE THERMODYNAMICS TO FRACTURE IN COMPOSITE MATERIALS Final Report
Paul H. Lindenmeyer Apr. 1983 43 p refs
(Contract NAS1-16301)
(NASA-CR-166074; NAS 1.26:166074) Avail: NTIS HC A03/MF A01 CSCL 11D

The fracture criteria upon which most fracture mechanics is based involves an energy balance that is not appropriate for the fracture mechanics of viscoelastic materials such as polymer matrix composites. A more appropriate criterion based upon nonequilibrium thermodynamics and involving a power balance rather than an energy balance is proposed. This criterion is based upon a reformulation of the second law of thermodynamics which focuses attention on the total Legendre transform of energy expressed as a functional over time and space. This excess energy functional can be shown to be equivalent to the Rice J integral if the only irreversible process is the propogation of a single crack completely through the thickness of the specimen and if the crack propogation is assured to be independent of time. For the more general case of more than one crack in a viscoelastic medium

integration over both time and space is required. Two experimentally measurable parameters are proposed which should permit the evaluation of this more general fracture criterion. M.G.

N83-22325*# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
WAVE PROPAGATION IN GRAPHITE/EPOXY LAMINATES DUE TO IMPACT Interim Report
T. M. Tan and C. T. Sun Dec. 1982 171 p refs
(Grant NsG-3185)
(NASA-CR-168057; NAS 1.26:168057; CML-82-5) Avail: NTIS HC A08/MF A01 CSCL 11D

The low velocity impact response of graphite-epoxy laminates is investigated theoretically and experimentally. A nine-node isoparametric finite element in conjunction with an empirical contact law was used for the theoretical investigation. Flat laminates subjected to pendulum impact were used for the experimental investigation. Theoretical results are in good agreement with strain gage experimental data. The collective results of the investigation indicate that the theoretical procedure describes the impact response of the laminate up to about 150 in/sec. impact velocity. S.L.

N83-22326*# Avco Corp., Lowell, Mass. Specialty Materials Div.
HYBRIDIZED POLYMER MATRIX COMPOSITES Final Report
J. Henshaw 4 Apr. 1983 70 p
(Contract NAS3-21385)
(NASA-CR-165341; NAS 1.26:165341) Avail: NTIS HC A04/MF A01 CSCL 11D

Methods of improving the fire resistance of graphite epoxy composite laminates were investigated with the objective of reducing the volume of loose graphite fibers disseminated into the airstream as the result of a high intensity aircraft fuel fire. Improvements were sought by modifying the standard graphite epoxy systems without significantly negating their structural effectiveness. The modifications consisted primarily of an addition of a third constituent material such as glass fibers, glass flakes, carbon black in a glassy resin. These additions were designed to encourage coalescense of the graphite fibers and thereby reduce their aerodynamic float characteristics. A total of 38 fire tests were conducted on thin (1.0 mm) and thick (6.0 mm) hybrid panels. Author

N83-22327*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
THE RESPONSE OF CYLINDRICAL PANELS FABRICATED FROM SYMMETRICALLY AND UNSYMMETRICALLY LAMINATED COMPOSITE MATERIALS Interim Report
Douglas M. Carper, Eric R. Johnson, and Michael W. Hyer Apr. 1983 79 p refs
(Contract NCC1-15)
(NASA-CR-170178; NAS 1.26:170178; VPI-E-83-14; IR-32) Avail: NTIS HC A05/MF A01 CSCL 11D

Equations are developed which govern the deflection response of long cylindrical panels subjected to a line load. The line load is directed toward the center of curvature of the panel, is located at an arbitrary point along the arc length of the panel, and is included at an arbitrary angle relative to the radial direction. Only the geometrically linear problem is considered and the spatial dependence in the problem is reduced to one independent variable, specifically, the arc length along the panel. The problem is thus solvable in closed form. Both symmetrically laminated and the less common unsymmetrically laminated simply supported panels are studied. The unsymmetrically laminated case was considered because the natural shape of an unsymmetric laminate is cylindrical. Results are presented which show the influence of the location and inclination of the line load on panel deflection. Shallow and deep panels are considered. Both the symmetric and unsymmetric panels exhibit similar behavior, the unsymmetric configurations being less stiff. Limited experimental results are presented. S.L.

N83-22328*# Clemson Univ., S.C. Dept. of Mechanical Engineering.
SHEAR-LAG ANALYSIS OF A HYBRID, UNIDIRECTIONAL COMPOSITE WITH FIBER DAMAGE Final Report
James G. Goree and Lokeswarappa R. Dharani Washington NASA Apr. 1983 53 p refs
(Grant NsG-1297)
(NASA-CR-3682; NAS 1.26:3682) Avail: NTIS HC A04/MF A01 CSCL 11D

Development of a method of analysis capable of predicting accurately the fracture behavior of unidirectional hybrid (buffer strip) composite laminates was studied. Three particular solutions are discussed in detail: broken fibers in a unidirectional half-plane; adjoined half planes of different fiber and matrix properties; and the solution of two half planes bounding a third distinct region of finite width. This finite width region represents a buffer strip and primary attention is given to the potential of this strip to arrest a crack that originates in one of the half planes. A materials modeling approach using the classical shear lag assumption to describe the stress transfer between fibers was analyzed. Explicit fiber and matrix properties of the three regions are retained, and changes in the laminate behavior as a function of the relative material properties, buffer strip width, and initial crack length are discussed. B.G.

N83-22329# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
RESIDUAL STRAIN AND STRENGTH LOSS IN FILAMENT WOUND CIRCULAR RINGS Final Report, 13 Oct. 1980 - 30 Sep. 1981
M. J. Dobie, P. J. Leavesley, and C. E. Knight, Jr. Aug. 1982 93 p refs
(Contract W-7405-eng-26)
(DE83-005073; Y/Sub-80-7733/1-01) Avail: NTIS HC A05/MF A01

Very high strength composite materials may be formed by the filament winding process using continuous filament yarns and a resin binder. The composite strength depends on the fibers being embedded in the resin matrix in a straight path. This research aims at quantifying the relationships between fiber winding tension, mandrel stiffness, winding thickness, and composite strength. An analytical model is developed based upon the finite element method which models the winding process. Two types of cylinders were fabricated for experimental correlation with the analytical model. DOE

N83-22330# McDonnell-Douglas Research Labs., St. Louis, Mo. Chemical Physics Dept.
CHARACTERIZATION OF KEVLAR 49 FIBERS BY ELECTRON PARAMAGNETIC RESONANCE Final Report, 20 May 1981 - 20 Jun. 1982
I. M. Brown and T. C. Sandreczki 20 Jun. 1982 44 p refs
(Contract W-7405-eng-48)
(DE83-004218; UCRL-15512; MDC-Q0775) Avail: NTIS HC A03/MF A01

Electron Paramagnetic Resonance (EPR) was used to investigate the free radicals created in Kevlar 49 fibers by stress induced and photo-induced macromolecular chain scissions. EPR lineshape anisotropy indicates that some of the metal ions and first coordinate spheres are oriented. The concentration of stress induced radicals suggest that chain scission occurs in more weak planes than are estimated to exist in the fracture surfaces of the fiber core. Several different types of radicals were obtained following uv irradiations of the Kevlar 49 fibers in vacuum (photodegradative radicals) and in air (photo-oxidative radicals). The photodegradative radicals are identified with primary radicals involved in the photo-Fries rearrangement reaction, secondary radicals formed as a result of a hydrogen atom abstraction by the primary radical, and/or ketyl radicals produced as a result of uv irradiation of the photo-Fries rearrangement product. The photo-oxidative radicals are identified with the uv irradiation products of a peroxide intermediate. B.G.

N83-22331# Kentucky Univ., Lexington. Dept. of Physics and Astronomy.
STUDIES OF THE MICROSCOPIC PHYSICAL AND CHEMICAL PROPERTIES OF GRAPHITE INTERCALATION COMPOUNDS Progress Report, Jul. 1981 - Feb. 1982
P. C. Eklund 1982 14 p refs
(Contract DE-AC05-81ER-10936)
(DE82-014095; DOE/ER-10936/01) Avail: NTIS HC A02/MF A01

Progress in the following studies is reported: optical properties, Raman and inelastic neutron scattering; hydrogen storage in alkali metal graphite intercalation compounds; intercalation chemistry of the MX5 graphite intercalation compounds (M = As, Sb, X = Cl, F); and low temperature magnetoresistance (acceptor GIC's) and pressure dependent superconductivity (donor GIC's). DOE

N83-22476# Idaho Univ., Moscow. Dept. of Mechanical Engineering.
RECENT RESEARCH ON DYNAMIC MECHANICAL PROPERTIES OF FIBER REINFORCED COMPOSITE MATERIALS AND STRUCTURES
R. F. Gibson *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 3-16 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 11/4

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N83-22332# Air Force Systems Command, Wright-Patterson AFB, Ohio. Laser and Optical Materials Branch.
PHOTOELECTRIC SPECTROSCOPY OF INDIUM IN SILICON Interim Technical Report, Jan. 1979 - May 1982
Thomas C. Chandler, Robert J. Spry, Gail J. Brown, John J. Rome, and Richard J. Harris (Dayton Univ.) Oct. 1982 27 p refs
(AF Proj. 2306)
(AD-A122592; AFWAL-TR-82-4131) Avail: NTIS HC A03/MF A01 CSCL 07/4

Photoelectric spectroscopy has been used to study P3/2, P1/2, and Breit-Wigner-Fano excited state transitions of indium in silicon. The photoelectric spectra were compared to absorption spectra, and measured as a function of temperature. All P3/2 and P1/2 absorption lines are resolved in photoelectric spectra, with the exception of No. 4B. This is the first observation in photoelectric spectra of lines 3 through 10, 3p', and 4p'. The temperature dependence of the spectra demonstrates that line intensities are governed by a photothermal ionization process; in particular, the activation energy of the line 4 intensity agrees with the theoretical binding energy of the excited state. Details previously observed in the Breit-Wigner-Fano spectra associated with P3/2 lines 2-10 have also been observed for the first time in the absorption spectra. GRA

N83-22333# Air Force Geophysics Lab., Hanscom AFB, Mass. Optical Physics Div.
THE COCHISE OBSERVATIONS OF O3 FORMED BY THREE-BODY RECOMBINATION OF O AND O2 Interim Report
W. T. Rawlins (Physical Sciences, Inc., Andover, Mass.) and R. A. Armstrong 17 Sep. 1982 20 p refs
(AF Proj. 2310)
(AD-A123653; AFGL-TR-82-0273; ERP-795) Avail: NTIS HC A02/MF A01

Infrared spectra of the v3 mode of ozone formed in the three body recombination of O atoms and O2 were observed. Temperature and pressure effects were investigated. Correlations with field experiments are presented along with high altitude longwave infrared (LWIR) emission implications. Author

N83-22334# Oklahoma State Univ., Stillwater. Dept. of Chemistry.
COMPUTER PROCESSING OF MASS-SPECTRAL DATA. PART 3: ASSIGNMENT OF FORMULAS TO EXPERIMENTAL MASSES. ALGORITHMS AND STRUCTURES OF PROGRAMS DBG, FZM, AND FZMIN
K. C. Chung, G. A. Barker, G. E. Hedrick, C. S. Hwang, T. D. Marriott, G. M. Stewart, D. F. Braisford, L. J. Karasa, O. G. Grindstaff, and G. P. Sturm, Jr. Dec. 1982 77 p refs 2 Vol.
(Contracts EX-76-S-01-2537; ET-76-S-03-1811; EW-78-A-19-0001)
(DE83-004163; DOE/BETC/RI-82/1) Avail: NTIS HC A05/MF A01

A computer method for the assignment of formulas to experimental masses has been developed. Programs FZM, DBG and FZMIN are the main programs controlling the procedures for processing the experimental masses. The main purpose of this document is to describe the development of these programs and the associated algorithms. Program FZM assigns formulas to the experimental masses using a pregenerated database. A database is generated by program DBG with respect to one of the homologous units CH2, CF2, CCl2, or CBr2 using a formula-acceptability-criterion-based bound and branched combinatorial algorithm as part of the formula-assignment process. Program FZM calculates the correct mass number of a species from its experimental mass on the appropriate Kendrick-mass scale and the truncating factor calculated by program DBG for the current database in order to locate the correct database table. The homologous-unit-mass-scale fractional masses in this table which lie within the user-specified region about the experimental Kendrick fractional mass are retrieved using a binary and linear search algorithm. The formula codes associated with these fractional masses are decoded. Program FZMIN admits on-line acquired mass spectral data to program FZM or remote execution. DOE

N83-22335# Oklahoma State Univ., Stillwater. Dept. of Chemistry.
COMPUTER PROCESSING OF MASS-SPECTRAL DATA. PART 4: ASSIGNMENT OF FORMULAS TO EXPERIMENTAL MASSES. SOURCE LISTINGS OF PROGRAMS DBG, FZM, AND FZMIN
K. C. Chung, G. A. Barker, G. E. Hendrick, C. S. Hwang, T. D. Marriott, G. M. Stewart, D. F. Braisford, L. J. Karasa, O. G. Grindstaff, G. P. Sturm, Jr. et al Dec. 1982 72 p refs 2 Vol.
(Contracts EX-76-S-01-2537; EW-78-A-19-0001; FT-76-S-03-1811)
(DE83-004099; DOE/BETC/RI-82/2) Avail: NTIS HC A04/MF A01

A versatile and efficient computer method for processing masses has been developed. Program FZM assigns formulas and specific Z values to masses using a pregenerated database. The databases are generated by program DBG. Program FZMIN admits either on-line of off-line acquired data to program FZM for remote execution. Source listings of the three FORTRAN programs are reproduced to provide both a reference to be used in conjunction with the external documentation of the method and a means of code check programs reproduced on requestor-furnished magnetic tape. DOE

N83-22336# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
FLASH PYROLYSIS OF BIOMASS WITH REACTIVE AND NON-REACTIVE GASES
Meyer Steinberg and Peter T. Fallon Jun. 1982 22 p ref Presented at the 14th Biomass Thermochem. Conversion Contractors' Meeting, Arlington, Va. 23-24 Jun. 1982
(Contract DE-AC02-76CH-00016)
(DE83-001850; BNL-51560) Avail: NTIS HC A02/MF A01

The rapid or flash pyrolysis of wood biomass is being studied in a 1 in. downflow entrained tubular reactor with a capacity of approximately 1 lb/hr of wood. The process chemistry data is

being obtained with the view of building a data base and ascertaining the value of producing synthetic fuels and chemical feedstocks by the flash pyrolysis method. Data is being obtained on the effect of nonreactive pyrolyzing gases and the effect of reactive gases, hydrogen for the flash hydropyrolysis of wood and methane for flash methanolysis of wood. Preliminary process design and analysis has been made. The yield of ethylene and benzene is especially attractive for the production of chemical feedstocks from the reaction of methane and wood in a flash methanolysis process. DOE

N83-22337# Catalytic, Inc., Wilsonville, Ala.
SRC-I SOLVENT-REFINED-COAL PROCESS. OPERATION OF THE SOLVENT-REFINED-COAL PILOT PLANT, WILSONVILLE, ALABAMA Quarterly Technical Progress Report, Apr. - Jun. 1981
Mar. 1982 171 p
(Contract DE-AC22-76ET-10154; EPRI Proj. RP-1234-1-2)
(DE82-009931; DOE/ET-10154/96) Avail: NTIS HC A08/MF A01

Solvent refined coal (SRC-1) pilot plant operated for approximately 81% of the second quarter of 1981. Kentucky 9 coal from the Fies mine was processed in all runs. The following potential process improvements and tests were evaluated: in the SRC unit operate of the new, reduced volume and residence time V103 High Pressure Separator, dissolver temperature and pressure variation studies, evaluation of the hot separator mode of operation, and evaluation of SRC unit reaction section conditions for two-stage liquefaction; in the critical solvent deashing (CSD) unit - steam stripping of SRC to reduce product related deashing solvent (DAS) losses, evaluation of the heated screw and rotary air lock on the continuous ash discharge vessel, equilibrium studies in the first stage, and evaluation of the CSD unit performance at increased feed rates; and in the hydrotreater unit - collection of operating data for preliminary evaluations. DOE

N83-22338# Hydrocarbon Research, Inc., Lawrenceville, N. J.
LABORATORY PROGRAM TO SUPPORT H-COAL PILOT-PLANT OPERATIONS. VOLUME 3. PDU RUN 9: APPENDICES B AND C
Feb. 1982 96 p refs 3 Vol.
(Contracts DE-AC05-77ET-10152; EX-77-C-01-2547)
(DE82-011893; DOE/ET-10152/T12-Vol-3; FE-2547-50-Vol-3)
Avail: NTIS HC A05/MF A01

A 3.5 lb charge of American Cyanamide 1442A CoMo catalyst was activated in a thermal neutron flux. This catalyst was inserted into H-Coal Process Demonstration unit (DPU) run no. 9 and subsequent daily withdrawals and the final dump were analyzed for Co(60). The activity of the Co(60) in the withdrawals reached a maximum approximately seven days after insertion of the tag. Activity of the PDU, the cyclone underflow and overflow, offgas, and the vacuum bottoms were monitored continuously during the run. No activity was observed in the gas, and small amounts were detected in the other areas which agreed with the predictions based upon 4% attrition. DOE

N83-22339# Catalytic, Inc., Wilsonville, Ala.
1980 OPERATION OF SRC PILOT PLANT, WILSONVILLE, ALABAMA Annual Report, Jan. - Dec. 1980
Feb. 1982 198 p refs Sponsored in part by EPRI
(Contracts DE-AC22-76ET-10154; EX-76-C-01-2270; EPRI Proj. 1234-1-2)
(DE82-008323; EPRI-AP-2235) Avail: NTIS HC A09/MF A01

The operating conditions and test results obtained during 1980 at the six ton per day solvent refined coal (SRC-1) pilot plant in Wilsonville, Alabama are discussed. The plant was in operation for the equivalent of 247 days, an on stream factor of 67.7%. Kentucky 9 coals from the Lafayette, Dotiki and Fies mines were processed. During 1980, the operating conditions and equipment were adjusted to evaluate potential process improvements. These experiments produced significant results in the following areas: Operating V103 high pressure separator in the hot mode; varying T102 vacuum column operating temperature; adding light SRC, a product of the third stage of the critical solvent deashing unit, to the process solvent; investigating the effects of the chlorine content of the feed coal on corrosion in the process vessels; and evaluating the effects of adding sodium carbonate on corrosion rates. DOE

N83-22340# Life Systems, Inc., Cleveland, Ohio.
DEVELOPMENT OF STATIC FEED WATER ELECTROLYSIS FOR LARGE SCALE HYDROGEN PRODUCTION Final Report
K. A. Burke and F. H. Schubert Jul. 1982 52 p refs
(Contract DE-AC02-76CH-00016)
(DE83-003827; BNL-51578) Avail: NTIS HC A04/MF A01

High current density testing with the static feed approach to water electrolysis demonstrated that there are no mass transport limitations in the static feed cell up to 1000 ASF and life systems' advanced electrode and super electrode are capable of operating at high current densities. Both types of electrodes exhibit voltage efficiency performance exceeding that of conventionally used water electrolysis electrodes, and have the potential to generate low cost hydrogen. The static feed water electrolysis cell is capable of operating from low quality water sources without electrochemical performance deterioration. Because of the elimination of the bulk KOH electrolyte from the feed water compartment, it appears feasible that the static feed cell design can be simplified from a four compartment cell to a three compartment cell where the coolant and water feed functions are combined in one compartment and the static feed electrolysis system is simpler in overall system design than comparable conventional systems. DOE

N83-22341# Bendix Corp., Kansas City, Mo. Technical Communications.
GAS ANALYSIS BY TIME-OF-FLIGHT MASS SPECTROMETRY Final Report
R. E. Smith Nov. 1982 12 p
(Contract DE-AC04-76DP-00613)
(DE83-003315; BDX-613-2774) Avail: NTIS HC A02/MF A01

Analytical methods for the determination of gases by time of flight mass spectrometry have been developed. Instrument operating parameters have been evaluated. The basic principles of operation are described. The analysis of standard nitrogen, argon, and helium gases are compared. This method is particularly suited for hydrogen determination. The amount of time required for instrument warm up was either two or six hours, depending on whether the instrument was kept in the standby mode overnight. The reproducibility of the time of flight mass spectrometry was found to be 4.3 percent relative standard deviation. DOE

N83-22342# Catalytic, Inc., Wilsonville, Ala.
CATALYTIC HYDROGENATION UNIT STUDIES
H. E. Lewis Nov. 1982 102 p refs Sponsored in part by EPRI Prepared in cooperation with Southern Services. Inc., Birmingham, Ala.
(Contract DE-AC22-82PC-50041)
(DE83-003390; DOE/PC-50041/2; TR-4) Avail: NTIS HC A06/MF A01

The ebullated bed hydrotreater is fully operational. This unit was installed to upgrade SRC product, expand the product slate flexibility, and improve hydrogen utilization efficiency. An analysis of the hydrotreater unit operating data is presented. Solvent refined coal was produced from Kentucky 9 (Fies) coal and from Illinois 6 (Burning Star) coal and was processed using a commercially available cobalt-molybdenum hydrodesulfurizing catalyst. The unit was operated over a fairly wide range of space velocities (1.1 to 2.2 lb/hr feed per lb catalyst) and reactor temperatures (6500F to 8300F). A total of twenty-six unit material balances, under varying operating conditions, were completed. The daily operating and material balance data were used for analysis and correlation. A three lump first order kinetic model was developed to describe the steady state behavior of the reactor. A catalyst deactivation model based on intrinsic activity, and rate of loss of this activity (separable decay) is proposed. DOE

N83-22343# California Univ., Livermore. Lawrence Livermore Lab.
PERMEABILITY OF STEMMING MATERIALS FOR PROMPT GAS SAMPLING
J. Beiriger and D. Trimmer Jan. 1982 14 p
(Contract W-7405-eng-48)
(DE82-012491; UCRL-53257) Avail: NTIS HC A02/MF A01

The permeability and porosity of a suite of man-made granular aggregates and stemming materials currently in use at NTS was measured in 1-D loading as a function of stress. In all cases, the gas permeability was measured at 22 MPa after cycling up and down from 100 to 1200 MPa. Depending on stress and material, permeability decreased up to three orders of magnitude, porosity up to 63% and the sample compacted by as much as 35%. Steel ball bearings were found to retain the highest permeability of all the materials tested. The enhancement of prompt gas sampling through alternate stemming material in the column above the nuclear device is discussed. DOE

N83-22344# Brookhaven National Lab., Upton, N. Y.
LIQUID HELIUM
E. C. Svensson (Atomic Energy of Canada Ltd.) Sep. 1982 7 p refs Presented at the Conf. on the Neutron and its Appl., Cambridge, UK, 13 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE83-001302; BNL-31916; CONF-820950-4) Avail: NTIS HC A02/MF A01

Neutron scattering on liquid (4) He were studied. Simplified interpretation of the dynamics and to new values for the condensate fraction are summarized. DOE

N83-22345# Sandia Labs., Livermore, Calif.
HYDROGEN-NITROUS OXIDE FLAME STUDY
Robert J. Cattolica, Michael D. Smooke, and Anthony M. Dean (Exxon Research and Engineering Co., Linden, N.J.) Oct. 1982 48 p refs Presented at Combustion Inst. Symp. on Western States Section, Fall Meeting 1982, Livermore, Calif., 11-12 Oct. 1982
(Contract DE-AC04-76DP-00789)
(DE83-002213; SAND-82-8776; CONF-821035-3) Avail: NTIS HC A03/MF A01

Laser fluorescence and absorption spectroscopy have been used to investigate a stoichiometric H2/N2O flame stabilized on a porous plug flat flame burner at atmospheric pressure. Concentration profiles of OH, NH and NO, and the temperature profile were obtained. A detailed chemical kinetic mechanism which describes the flame chemistry was evaluated using a one dimensional flame code which included multicomponent diffusional transport. This chemical kinetic mechanism was able to predict the observed OH, NH, and NO concentration levels within the experimental accuracy. These concentration levels were found to depend strongly on the two product channels of the H + N2O reaction: N2 + OH and NH + NO. DOE

N83-22346# Duquesne Univ., Pittsburgh, Pa. School of Pharmacy.
HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC GROUP-TYPE ANALYSIS OF THE PRODUCT OF FISCHER-TROPSCH SYNTHESIS Final Report
Joseph A. Feldman 12 Jan. 1983 19 p
(Contract DE-FG22-81PC-41766)
(DE83-005482; DOE/PC-41766/T1) Avail: NTIS HC A02/MF A01

Early in this study the unique properties of the Fluorinerts as HPLC eluting solvents became evident. This made it necessary to study behavior of detector response as a function of analyte concentration, the miscibility of different solvents with the fluorinerts, and the solubility of paraffin, olefinic, and Fischer-Tropsch products in the Fluorinerts. Along with these factors, column behavior as a function of preconditioning or activation and particle size had to be evaluated. As most of the interest appeared to be focused in knowing the amount and distribution of the normal paraffins and the terminal olefins, standards using paraffin mixtures from C8-C15 and olefinic mixtures consisting of members from C(??)-C14 were used. When Fischer-Tropsch product samples were employed, it became quite evident that compounds eluting well beyond the retention time for the C15 hydrocarbon were present. As information relative to the presence of oxygenated compounds, their possible class or whether aromatic compounds were also present, was lacking, no attempt was made to identify the unknown compounds. The investigations showed that it is possible to separate terminal olefins from normal paraffins provided there is no more than a six carbon difference in chain length using two activated silica columns containing five or six micron packings. One can avoid Schlieren effects by using sufficiently small amounts of analyte. The use of non-mixed solvent systems aid in consistent baselines. Quantitation is achievable within a 10% relative error under optimum separating conditions. DOE

N83-22347# Oak Ridge National Lab., Tenn. Chemical Technology Div.
MULTICOMPONENT SEPARATIONS USING A CONTINUOUS ANNULAR CHROMATOGRAPH
John M. Begovich Dec. 1982 284 p refs
(Contract W-7405-eng-26)
(DE83-004690; ORNL-5915) Avail: NTIS HC A13/MF A01

Multicomponent liquid chromatographic separations were achieved by using a slowly rotating annular bed of sorbent material. By continuously introducing the feed material to be separated at a stationary point at the top of the bed and eluent everywhere else around the annulus, elution chromatography occurs. The rotation rate of the sorbent bed causes the separated components to appear as helical bands, each of which has a characteristic, stationary exit point; hence, the separation process is truly continuous. The continuous separation of copper, nickel, and cobalt from an ammoniacal leach liquor was used to evaluate the behavior and capabilities of a variety of continuous annular chromatographs (CACs). The experimental units ranged in diameter from 89 to 445 mm and in annulus width from 6 to 51 mm. The effects of feed rate, feed concentration, rotation rate, element and eluent velocity, and column size were experimentally determined and modeled to show how they affect the performance of a CAC system. DOE

N83-22348# Brookhaven National Lab., Upton, N. Y. Atmospheric Sciences Div.
DOCUMENTATION AND DATA MANAGEMENT FOR PRECIPITATION CHEMISTRY NETWORKS
Carmen M. Benkovitz and M. Terry Dana (Battelle Pacific Northwest Lab.) 1982 17 p Presented at the Methods for Comparing Precipitation Chem. Data Workshop, Rensselaerville, N.Y., 10-12 Aug. 1982
(Contracts DE-AC02-76CH-00016; DE-AC06-76RL-01830; EPR-79-D-X-0533)
(DE83-000210; BNL-31840; CONF-820888-1) Avail: NTIS HC A02/MF A01

Traceability, which is really what this paper is all about (and the working groups involved with quality assurance are largely concerned with) should be defined, and the means by which information can be traced back through the sampling-to-data-base procedure should be specified in report format. Although the outside data user is not apt to do the tracing, the procedure through which this is done and the time required for tracing information about a sample should be known. DOE

N83-22349# Institute of Gas Technology, Chicago, Ill.
STATUS OF THE CADMIUM THERMOELECTROCHEMICAL HYDROGEN CYCLE
Thomas P. Whaley, Bernard D. Yudow, Robert J. Remick, Jon B. Pangborn, and Anthony F. Sammells 1982 8 p refs Presented at the World Hydrogen Energy Conf., Pasadena, Calif., 13-17 Jun. 1982
(DE83-900088; CONF-820605-20) Avail: NTIS HC A02/MF A01

The three step cadmium thermoelectrochemical water splitting cycle which produces hydrogen by an electrochemical reaction of water with an anode of cadmium metal, which is regenerated by

the thermochemical decomposition of by product cadmium oxide at temperatures of 12000C and higher is discussed. Work on the electrochemical step is centered on the removal of the passivating layer of cadmium hydroxide that forms on the cadmium metal anode. The high temperature thermochemical decomposition of cadmium oxide is carried out successfully in a solar furnace. DOE

N83-22350# Department of Energy, Laramie, Wyo. Energy Technology Center.
REVERSE-COMBUSTION, HORIZONTAL RETORTING OF OIL SHALE
I. A. Jacobson, Jr. 1982 32 p refs
(DE83-000018; DOE/LC/RI-82/6) Avail: NTIS HC A03/MF A01

Retorting of Green River oil shale by reverse combustion was studied in an adiabatic horizontal retort of approximate 226 kg (500 lb) capacity. The effects of air injection rate, system pressure, steam injection, and outlet temperature of the retort on oil yield and properties and product gas quantity and quality were studied. Product gas from the tests was of low heating value with a relatively high hydrogen and carbon monoxide content in the absence of steam injection. Oil yield was generally less than 50 volume percent of Fischer assay potential due to thermal cracking and possible product combustion. Regression equations are presented to allow estimation of oil yield and properties and product gas properties and compositions based on the retort operating variables. It was found that total usable energy recovery from the raw oil shale could be influenced by changes in test parameters. DOE

N83-22351# Department of Energy, Grand Forks, N. Dak. Energy Technology Center.
EFFECTS OF SEVERAL DISPOSABLE CATALYSTS ON LIQUEFACTION OF LIGNITE
Gene G. Baker, Thomas C. Owens (North Dakota Univ.), and John R. Rindt (North Dakota Univ.) 1982 22 p refs Presented at the Am. Soc. of Civil Engrs. Ann. Meeting, New Orleans,
(DE82-022188; CONF-821036-1) Avail: NTIS HC A02/MF A01

Batch and continuous coal liquefaction tests with several iron and sulfur based additives plus coals treated by ion exchange techniques indicate product quality and yields can be significantly influenced with some coals. Generally, it appears iron compounds are required to improve the hydrogen-to-carbon ratio of the product and that H2S offers promise in maintaining good yields of desired products at reduced liquefaction temperatures and of reducing hydrogen consumption. Treating lignite by ion exchange techniques prior to liquefaction did not give encouraging results. DOE

N83-22352# Science Applications, Inc., Chatsworth, Calif. Combustion Science and Advanced Technology Dept.
STUDY OF NET SOOT FORMATION IN HYDROCARBON REFORMING FOR HYDROGEN FUEL CELLS Final Report
R. B. Edelman, R. C. Farmer, and T. S. Wang Aug. 1982 43 p refs
(Contract DE-AC21-79MC-12735)
(DE83-001046; DOE/MC-12735/1251) Avail: NTIS HC A03/MF A01

A quasi-global kinetics model to represent the homogeneous and heterogeneous reactions which control the autothermal hydrogen reforming process was studied. The accompanying soot formation and gasification was emphasized. DOE

N83-22353# Monsanto Research Corp., Dayton, Ohio.
OIL/REFUSE HOMOGENIZATION: AN APPROACH TO COMBUSTION OF REFUSE IN EXISTING OIL-FIRED BOILERS
R. G. Beer and T. E. Ctvrtnicek Feb. 1982 32 p refs
(Contract DE-AC01-79CS-20175)
(DE82-011848; DOE/CS-20175/1) Avail: NTIS HC A03/MF A01

The feasibility of grinding and mixing one type of pretreated municipal solid waste, refuse derived fuel (RDF), with No. 6 (bunker C) fuel oil to obtain a fuel potentially combustible in existing oil fired boilers was investigated. The feasibility of reducing an RDF 2 inch in size to lumps of which 90% by number were less than 30 millimicrons across and to fibers typically 1000 millimicrons long or less and less than 1 millimicron in diameter was demonstrated using a disc mill. The ground refuse oil (refoil) mix, however, contained deformed metal particles that will require removal to prevent clogging of burner nozzles. Investigations into refoil atomization and metal particle removal and firing the refoil in a pilot, small, or medium size oil fired boiler to establish the refoil atomization and combustion characteristics and the impact of refoil on boiler operation and emissions are recommended. DOE

N83-22354# SRI International Corp., Menlo Park, Calif.
EXPLORATORY STUDY OF COAL CONVERSION CHEMISTRY Quarterly Report, 19 Nov. 1981 - 18 Feb. 1982
David S. Ross, Donald F. McMillen, Walter C. Ogier, Richard Bunnell, and Georgina P. Hum Mar. 1982 46 p refs
(Contract DE-AC22-81PC-40785)
(DE82-013414; DOE/PC-40785/3; QR-3) Avail: NTIS HC A03/MF A01

Data on the rate and mechanisms of radical induced cleavage of strong C-C and C-0 bonds in coal structures are given. It was shown that even resonance stabilized radicals, which form relatively weak C-C bonds, can displace other resonance stabilized radicals from methylene bridged coal structures. Kinetic studies reveal that either the self disproportionation of 1,2-dihydronaphthalene is much faster than previously reported or that the 1,2-dihydronaphthalene tetralin disproportionation is much less important as a radical initiation process than thermochemical estimates suggested. Prime 1,2-dinaphthylmethane undergoes radical induced CH2-Ar bond scission ten times faster than diphenyl ether. This factor is shown to be consistent with the thermochemistry of displacement by tetralyl radical. CO/H2O conversion of a second, high volatile bituminous coal, PSOC-233 was also studied. With PSOC-026, the initial pH did affect the conversion rate, increasing with higher pH. DOE

N83-22355# Hydrocarbon Research, Inc., Lawrenceville, N. J.
CATALYTIC EVALUATION FOR H-COAL Final Report
A. G. Comolli, D. T. A. Huibers, E. S. Johanson, and C. L. Weber Mar. 1982 269 p ref
(Contract DE-AC22-78ET-10742)
(DE82-014457; DOE/FE-10742/44) Avail: NTIS HC A12/MF A01

An improved H Coal catalyst was investigated. A catalyst with an optimum bimodal pore size distribution, and an optimum balance of cracking and hydrogenation functions via the use of promoters was developed. Bench scale unit improvements were made to increase operating reliability, reduce the time required to obtain product analyses, and increase the accuracy and reproducibility of product analyses leading to a better material balance and more accurate calculations of conversion rates. Unit modifications were also made to reduce potential operating problems with fluid flow, reduce loss of light liquid hydrocarbons and other products that might evaporate during operations, and measure of unit material inventories using the DASH computer system. DOE

N83-22356# Illinois Univ., Chicago.
REVIEW OF HOT-GAS-DESULFURIZATION SIMULATION MODELS
S. C. Saxena Morgantown, W. Va. DOE Feb. 1982 75 p refs
(Contract DE-AC21-81MC-18668)
(DE82-016265; DOE/MC-18668/1186) Avail: NTIS HC A04/MF A01

The removal of hydrogen sulfide and other sulfur gaseous compounds from the fuel gas of coal gasification plants using iron and zinc oxides was accomplished with promising success. Associated with this desulfurization process is the problem of regeneration of the metal sulfides formed back to the oxide state for reuse. For the efficient design and optimum operation of process plants, it is imperative that the reaction mechanism for the gas-solid reactions be known as also the gas and solids dispersion and movement in the reactor. In recent years, four mechanistic models were developed and proposed for this purpose. Models intended for use in connection with the noncatalytic gas-solid reactions are briefly described. They are: shrinking core model,

homogeneous model, grain model, and pore model. All the four models were employed to mechanistically describe the desulfurization process in a fixed bed of granular metal oxide. DOE

N83-22357# Westinghouse Electric Corp., Pittsburgh, Pa.
GAS CHARACTERIZATION FROM FLUIDIZED-BED COAL GASIFICATION Quarterly Report, 1 Dec. 1981 - 28 Feb. 1982
D. F. Ciliberti, E. E. Smeltzer, N. T. Rohatgi, M. A. Alvin, D. L. Keairns, A. B. Turner, and F. Lagonik 1982 30 p
(Contract DE-AC21-81MC-16024)
(DE82-012396; DOE/MC-16024/T4; QR-2) Avail: NTIS HC A03/MF A01

A proposal to characterize the nature of alkali, trace metal, particulate, and hydrocarbon emissions in the hot fuel gas stream produced in a fluidized bed gasifier. The potential environmental and process implications of these emissions will be studied. The characterization would consist of determining the amounts of contaminants associated with the particulate emissions relative to the amounts and types of gaseous species. The particulate-associated contaminants would be further analyzed to determine their soluble and insoluble fractions as well as the particular species present. The primary method of sampling will be based on isokinetic extractive sampling. Upon analysis of the species and amounts of alkali, trace metal, and hydrocarbons found, attempts will be made to correlate the effects of feedstocks and operating parameters with these emissions. This will be used to develop a basis for projecting emission profiles in fluidized bed gasification processes. DOE

N83-22358# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
COAL-GASIFICATION AND TAR-CONVERSION REACTIONS OVER CALCIUM OXIDE Quarterly Progress Report, 1 Nov. 1981 - 31 Jan. 1982
John P. Longwell, Cheng-Shiou Chang, and William A. Peters Apr. 1982 11 p refs
(Contract DE-AC21-81MC-16026)
(DE82-014635; DOE/MC-16026/2) Avail: NTIS HC A02/MF A01

The major efforts were concentrated on system constructions and development of sampling and analytical procedures. Several preliminary (1)H-NMR and (13)C-NMR spectra of a simulated coal tar sample were obtained. The result of (13)C-NMR spectroscopy shows that reliable quantitative (13)C studies can be achieved through a combination of NMR techniques, i.e., the use of Fourier Transform NMR (FT-NMR), gated proton decoupling, extended time delay between spectrometer scans and the application of paramagnetic species in the sample solution. Important global structural parameters characteristic of different coal tars, such as aromaticity, degree of substitution of aromatic rings, hydrogen distribution, etc., can be determined from data of (1)H-NMR, (13)C-NMR and elemental analysis. DOE

N83-22359# Cooper Union, New York. Research Foundation.
COMPUTER ANALYSIS OF ENTRAINMENT FLOW GASIFICATION PHENOMENA Quarterly Technical Progress Report, 10 Nov. 1981 - 10 Feb. 1982
Shang-I Cheng 1982 17 p refs
(Contract DE-AC21-81MC-16433)
(DE82-008681; DOE/MC-16433/T2; QTPR-2) Avail: NTIS HC A02/MF A01

During this quarter, in addition to the detailed examination of subroutines, a new vapor-phase phase imperfection subroutine was developed. The calculation of physical properties of coal was incorporated, and the kinetics subroutine was modified to determine whether a reaction is diffusion rate controlling. Each of the areas is being reported below. DOE

N83-22360# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
COAL-LIQUEFACTION-PLANT FRACTIONATION-COLUMN CORROSION-COUPON STUDIES
J. R. Keiser, V. B. Baylor, M. Howell, and J. F. Newsome 1982 32 p refs
(Contract W-7405-eng-26)
(DE82-007469; ORNL/TM-7933) Avail: NTIS HC A03/MF A01

Severe corrosion has been observed in fractionation columns at the Fort Lewis, Washington, and Wilsonville, Alabama, solvent refined coal pilot plants. This corrosion is most severe for materials exposed in the 220 to 260 C (430 to 500 F) range and results in corrosion rates of as much as 6.4 mm/y (250 mils/y) for type 18-8 stainless steels. Studies at ORNL of this corrosion problem include exposure of coupons in the columns, analysis of failed components from the pilot plants, chemical analyses of liquids from the pilot plants, and operation of laboratory experiments. This report describes the coupon exposure studies, gives the results of these studies, and discusses the selection of fractionation column materials on the basis of our experience. The studies show that several high-nickel alloys have corrosion rates of less than 0.25 mm/y (10 mils/y) and would be suitable in a fractionation column environment even if no process changes are made to reduce offending species such as chlorine. DOE

N83-22361# Combustion Engineering, Inc., Windsor, Conn. Power Systems Div.
EFFECT OF LIQUEFACTION PROCESSING CONDITIONS ON COMBUSTION CHARACTERISTICS OF SOLVENT-REFINED COAL Interim Report
G. J. Goetz, T. C. Lao, A. K. Mehta, and N. Y. Nsakala Mar. 1982 176 p refs Sponsored by EPRI
(EPRI Proj. 1412-9)
(DE82-903665; EPRI-AP-2328) Avail: NTIS HC A09/MF A01

One of several direct liquefaction processes currently under advanced stages of development is the Solvent-Refined Coal-I (SRC-I) process. A major SRC-I product option is a low sulfur, low ash solid (SRC) which could be used as an electric utility boiler fuel much in the same manner that pulverized coal is currently fired in this type of combustion equipment. SRC-I processing was performed using three variations in the manner in which mineral matter and unconverted coal are separated from the hot coal liquid. These processes are the Pressure Filtration Deashing, Anti-Solvent Deashing, and Critical Solvent Deashing. Since processing conditions may influence the combustion of SRC-I solids produced, an experimental program was carried out at both the bench and pilot plant scale to determine the influence of processing (i.e., solids separation method) and combustion conditions on carbon burnout of these three varieties of SRC solid boiler fuels. DOE

N83-22362# Texaco, Inc., El Monte, Calif.
ENRICHED-AIR AND OXYGEN GASIFICATION OF ILLINOIS NO. 6 COAL IN A TEXACO COAL-GASIFICATION UNIT
W. B. Crouch, G. N. Richter, and E. W. Dillingham Feb. 1982 40 p Sponsored by EPRI
(EPRI Proj. 985)
(DE82-903133; EPRI-AP-2214) Avail: NTIS HC A03/MF A01

Four runs were made with Illinois No. 6 coal to demonstrate technology to integrate the coal gasification process in an environmentally acceptable manner with gas turbines for combined cycle electric power generation. Operability and response of the gasifier and a Selexol acid gas removal unit were demonstrated during load changes utilizing both oxygen and enriched air as oxidants (transient runs). Steady state performance data on the gasifier, Selexol unit and gas turbine combustor were obtained at a variety of oxygen to coal ratios at different production rates utilizing each oxidant (steady state runs). Essentially no effect of charge rate on the syngas quality was noted. Environmental base line data were gathered for both oxidants. DOE

N83-22363# State Univ. of New York, Buffalo.
CATALYTIC COAL LIQUEFACTION Quarterly Report, Jan. - Mar. 1982
Sol W. Weller 1982 31 p refs
(Contract DE-FG22-81PC-40781)
(DE82-012562; DOE/PC-40781/T2; FE-2013-19) Avail: NTIS HC A03/MF A01

A review was written covering the use of molybdenum catalysts, both unsupported and supported, in coal liquefaction. When unsupported molybdenum compounds are used in a once-through mode, the degree of dispersion becomes very important; in this respect molybdenum catalysts differ from the tin-halogen acid system for coal liquefaction. Supported catalysts, such as MoO3/CoO/Al2O3, become deactivated when used in fixed-or ebullating-bed processes. The deactivation results largely from deposition of coke and metals in pores, but there is evidence also for the formation, migration, and crystallite growth of MoS2 during extended use of supported catalysts. Some of the early results on coal liquefaction with molybdenum catalysts in Germany and at the Bureau of Mines are reviewed, along with more recent laboratory experiments. Emphasis is placed on the problems of understanding the chemical role of catalysts in liquefaction. DOE

N83-22364# Sandia Labs., Albuquerque, N. Mex.
APPLICATION OF FOURIER-TRANSFORM INFRARED (FT-Ir) SPECTROSCOPY TO IN-SITU STUDIES OF COAL COMBUSTION
D. K. Ottesen and L. R. Thorne Apr. 1982 27 p refs Presented at the Spring Meeting of the Western States Section of the Combustion Inst., Salt Lake City, 12 Apr. 1982
(Contract DE-AC04-76DP-00789)
(DE82-015766; SAND-82-8672; CONF-820403-6) Avail: NTIS HC A03/MF A01

The feasibility of using Fourier-transform infrared (FT-ir) spectroscopy for in situ measurement of gas phase species concentrations and temperature during coal combustion is examined. This technique is evaluated in terms of its potential ability to monitor several important chemical and physical processes which occur in pulverized coal combustion. FT-ir absorption measurements of highly sooting, gaseous hydrocarbon/air flames are presented to demonstrate the fundamental usefulness of the technique for in situ detection of gas phase temperature and species concentrations in high temperature combustion environments containing coal, char, mineral matter and soot particles. Preliminary results for coal/gaseous fuel/air flames are given. DOE

N83-22365# Mound Lab., Miamisburg, Ohio.
RAMAN SPECTROSCOPY
Janine C. Birkbeck 30 Apr. 1982 28 p refs
(Contract DE-AC04-76DP-00053)
(DE82-014613; MLM-2896) Avail: NTIS HC A03/MF A01

A brief introduction to the theoretical principles of Raman spectroscopy is presented, as are the basics of instrumentation, sampling techniques, and applications. Comparison of the advantages and limitations of Raman to infrared spectroscopy are made throughout. The laser Raman spectroscopy capabilities are discussed as they relate to the two different systems. DOE

N83-22366# Los Alamos Scientific Lab., N. Mex.
CATALYTIC COAL CONVERSION SUPPORT. USE OF LASER FLASH-PYROLYSIS FOR STRUCTURAL ANALYSIS Progress Report, 15 Apr. 1979 - 30 Sep. 1981
W. J. Verzino, Jr., C. K. Rofer-DePoorter, and R. E. Hermes Mar. 1982 74 p refs
(Contract W-7405-eng-36)
(DE82-014124; LA-9269-PR) Avail: NTIS HC A04/MF A01

Untreated Fruitland subbituminous coal and Fruitland coal treated with several gasification catalysts were pyrolyzed with both Nd-glass and CO2 lasers to give both gaseous and intermediate molecular weight products, which were analyzed by gas chromatography (GC) and gas chromatography mass spectrometry (GC-MS). The catalysts used were AlCl3, K2H2Sb2O7, COCl2, PbCl2, Pb(NO3)2, Na2Pb(OH)6, Na2MoO4, NiCl2, K2CO3, KHCO3, Na2CO3, NaHCO3, Na2Ti3O7, NaVO3, ZnCl2, and NaZn(OH)3. Gaseous products were analyzed from the Nd-glass laser pyrolysis of the various catalysts, ZnCl2 was found to affect N2 production during pyrolysis most significantly. Intermediate products were analyzed from the CO2 laser pyrolysis, product distribution was found to depend upon particle size (and consequent thermal history in pyrolysis) as well as on catalyst and heat treatment. DOE

N83-22367# Spectron Development Labs., Inc., Costa Mesa, Calif.
PARTICULATE PROCESSES IN PULVERIZED-COAL FLAMES Quarterly Technical Progress Report, Nov. - Jan. 1982
Jan. 1982 22 p refs
(Contract DE-AC22-80PC-30300)
(DE82-014306; SDL-82-2177-29Q) Avail: NTIS HC A02/MF A01

Major attention was focused on the characterization of pulverized coal particles and on the performance testing of both the open burner and the furnace burner. The axial temperature distributions of both burners were mapped. The axial temperature decay varied between 250 and 500 K per meter. This is to be compared with the design goal of 200 K per meter but is considered satisfactory for our experimental requirements. Holographic investigation of coal decomposition was initiated during this period but was limited to the open burner. However, in order to produce a coherent observation of the decomposition phenomenology, the holographic results are purposely excluded and will be incorporated into a later report pending the completion of holographic experiments with the furnace burner. DOE

N83-22368# Bureau of Mines, Albany, Oreg.
ELECTROCHEMICAL DETERMINATION OF THERMODYNAMIC PROPERTIES OF MANGANOMANGANIC OXIDE AND MANGANESE SESQUIOXIDE
Seth C. Schaefer Aug. 1982 23 p refs
(PB83-111294; BM-RI-8704) Avail: NTIS HC A02/MF A01 CSCL 07D

Thermodynamic properties of Mn3O4 (manganomanganic oxide) and Mn2O3 (manganese sesquioxide) were investigated. The standard Gibbs energies of formation (delta G(f)) of Mn3O4 and Mn2O3 from their lower oxides were determined with high temperature galvanic cells using stabilized ZrO2 (zirconia) as the electrolyte. GRA

N83-22369# Council for Mineral Technology, Randburg (South Africa).
THE USE OF MASKING AGENTS IN THE DETERMINATION, BY HYDRIDE GENERATION AND ATOMIC, BY HYDRIDE GENERATION AND ATOMIC-ABSORPTION SPECTROPHOTOMETRY OF ARSENIC, ANTIMONY, SELENIUM TELLURIUM AND BISMUTH IN THE PRESENCE OF NOBLE METALS
Susanna Petronella Kellerman 16 Jul. 1982 17 p refs
(PB83-109579; MINTEK-M39; ISBN-0-86999-572-3) Avail: NTIS HC A02/MF A01 CSCL 07D

The effectiveness of thiosemicarbazide, tellurium, and potassium iodide as masking agents to eliminate interferences was assessed. Thiosemicarbazide was found to be effective in eliminating or reducing the interferences on arsenic, antimony, and bismuth, and tellurium reduced the interferences on selenium. The interferences on tellurium could not be eliminated. Arsenic, antimony, selenium, and bismuth were determined in metal sulphide concentrates that were spiked with the noble metals (defined here as gold plus all the platinum group metals except osmium). The relative standard deviations for arsenic, antimony, bismuth, and selenium were 0,061, 0,017, 0,029, and 0,145 respectively. The values obtained for all the analytes agreed favorably with the preferred values for two inhouse reference samples. The laboratory method is detailed. GRA

N83-22370# National Bureau of Standards, Washington, D.C.
THERMODYNAMIC PROPERTIES OF ISOBUTANE Final Report
Meyer Waxman, Max Klein, John W. Gallagher, and J. M. H. Levelt Sengers Feb. 1982 180 p refs Sponsored in part by DOE
(PB83-111005; NSIR-83-2435) Avail: NTIS HC A09/MF A01 CSCL 07D

A thermodynamic surface is presented for the thermodynamic properties of isobutane for temperatures from 250 to 600 K and pressures up to 40 MPa, exclusive of the critical region. The surface expressed analytically is in the form of the Helmholtz free energy

as a function of temperature and density. The Helmholtz free energy is based upon three contributions: that of the ideal gas, of a physically based function incorporating the effects of molecular repulsion and attraction, and of a sum of residual terms that compensate for inadequacies of the physical based function. The surface is in accord with selected validated pressure-density-temperature data to within an average density tolerance of 0.1 percent and the liquid region with the exception of the critical region. The thermodynamic tables of isobutane expressed in three different unit systems and the computer programs for generating the properties are presented in the paper. GRA

N83-22371# National Bureau of Standards, Washington, D.C. National Engineering Lab.
INTERACTIVE FORTRAN PROGRAM TO CALCULATE THERMOPHYSICAL PROPERTIES OF SIX FLUIDS
Ben A. Younglove Jul. 1982 56 p refs
(PB83-117523; NBS-TN-1048) Avail: NTIS HC A04/MF A01 CSCL 07D

An interactive FORTRAN 4 computer program is given for computing thermophysical properties of argon, ethylene, parahydrogen, nitrogen, nitrogen trifluoride, and oxygen. The program is designed for use with a computer terminal accessing a large computer in an interactive mode. The program provides prompting for selection of several options including: (1) choice of fluid, (2) choice of SI or engineering units, (3) choice of the single phase or liquid-vapor phase, and (4) a table of properties or a single value. Properties are computed for the single phase region from input of two of the variables, temperature, pressure, and density. Values on the liquid-vapor boundary are computed from an entry of temperature or pressure. The program returns values for pressure, temperature, density, internal energy, enthalpy, specific heats at constant volume and pressure, and sound velocity. Viscosity, thermal conductivity, and dielectric constant are given for some of the fluids. GRA

N83-22372# National Bureau of Standards, Washington, D.C. National Engineering Lab.
A THERMODYNAMIC SURFACE FOR THE CRITICAL REGION OF ETHYLENE
J. M. H. Levelt Sengers, J. W. Gallagher, F. W. Balfour, and J. V. Sengers Oct. 1982 90 p
(PB83-118422; NBS-TN-1165) Avail: NTIS HC A05/MF A01 CSCL 07D

Tables are presented of thermodynamic properties of ethylene in the range 279 to 300 K in temperature, 5.75 to 10.5 mol/cu dm in density, which range includes the critical point. The tables presented are based on the critical-point scaling laws and incorporate the critical anomalies in a proper fashion. The tables thus complement the formulation of the equation of state of fluid ethylene by McCarty and Jacobsen which does not claim accuracy near the critical point. The predictions of the present formulation are compared with four sets of recent PVT data, and with speed-of-sound data. Tables are presented of pressure, energy, ethalpy, entropy, specific heats and speed of sound as function of temperature along finely-spaced isochrores. The computer program required for table generation is included. GRA

N83-22373# Nebraska Univ., Omaha.
STUDY OF CHEMISORPTION OF CO ON PLATINUM USING ELECTRON AND ION BEAM SURFACE PROBES Final Report, Jan. 1981 - May 1982
J. H. Craig, Jr. Jun. 1982 20 p
(GRI-80/0156) Avail: NTIS HC A02/MF A01 CSCL 07D

Studies of active gas adsorption were undertaken on polycrystalline platinum using the technique of surface mass spectroscopy. Thermal desorption spectroscopy (TDS), electron stimulated desorption (ESD), and ion induced desorption (IID) were used as surface probes to study (1) CO adsorption on platinum; (2) coadsorption of H2 and CO on platinum; and (3) adsorption of oxygen on platinum during the initial stages of uptake. Using ESD techniques, multiple states of CO on platinum were identified. By energy resolving the O+ ionic species during coadsorption of H2 and CO, the presence of a new surface complex was inferred as a result of H-CO interaction. TDS, ESD, and IID were employed to study the O2/Pt system. The presence of a molecular precursor state was inferred from the resulting data. Furthermore, negative ion (O-) ESD was observed during oxygen desorption, but not during uptake at room temperature. GRA

N83-22374# Southern Research Inst., Birmingham, Ala.
PREPARATION OF THIN ION-EXCHANGE MEMBRANES WITH EXCEPTIONALLY LOW RESISTANCES AND HIGH SELECTIVITIES Final Report, 1 Nov. 1980 - 31 Jan. 1981
Jan. 1981 44 p
(Contract DI-14-34-0001-0442)
(PB83-108001; SORI-EAS-81-216; W83-00261; OWRT-C-00107-5(0442)(1)) Avail: NTIS HC A03/MF A01 CSCL 07D

The development of improved ion-exchange membranes for desalting seawater or brackish waters with high salinities is discussed. Thin anion and cation exchange membranes were prepared that exhibit exceptionally low electrical resistances without sacrificing high current efficiencies (i.e., high selectivities) in solutions at seawater concentrations. Improved handling characteristics and lower replacement costs are anticipated. GRA

N83-22375# Missouri Univ., Rolla. Dept. of Chemical Engineering.
A STUDY OF GLOW DISCHARGE POLYMERIZATION AS A MEANS OF PREPARING COMPOSITE REVERSE OSMOSIS MEMBRANES WITH ULTRATHIN SKIN Final Report
H. Yasuda Jan. 1982 91 p refs
(Contract DI-14-34-0001-8525)
(PB83-107995; W83-00260; OWRT-C-80131-S(8525)(1)) Avail: NTIS HC A05/MF A01 CSCL 07D

Polymer thin film formation by glow discharge in organic vapors (glow discharge polymerization, or plasma polymerization (PP)) from a monomer (3.g., styrene) produces polymers which are considerably different from those formed from the same monomer by conventional polymerization. Such plasma polymers form highly branched and crosslined networks, excellent adhesion of a thin deposit to the substrate in glow discharge from low pressure plasma, are completely amorphous, and without macroscopic pinholes. Hence, an ideal composite reverse osmosis (RO) membrane can be prepared by PP using the proper porous substrate and PP conditions. Reproducibility and continuous operation feasibility, semi-continuous PP using hollow fibers was examined using a special constructed tandem reactor. Factors influencing continuous PP and variation of resultant RO membrane characteristics as a function of reaction time were investigated. While further improvement in the maximum salt rejection (90%) should be possible, the obtained water flux was exceptionally good. GRA

N83-22376# Connecticut Univ., Storrs. Inst. of Water Resources.
HAZARDOUS POLLUTANT ANALYSIS IN WATER USING INFRARED SPECTROSCOPY Technical Completion Report
Carol P. Anderson and Alan P. Bentz 1 Mar. 1982 25 p
(Contract DI-14-34-0001-0107)
(PB83-108373; W83-00231; OWRT-A-080-CONN(2)) Avail: NTIS HC A02/MF A01 CSCL 07D

A simple procedure involving an extraction concentration method followed by computer infrared (IR) spectral enhancement was developed which provides detection and identification of organic pollutant compounds of moderate to low volatility in estuarine and coastal waters, down to 1 to 10 ppm (depending on the IR absorptivity of the compounds). Since IR can be used for nonvolatile compounds, it is a natural complement to gas chromatographic techniques. GRA

N83-22377# Lenox Inst. for Research, Inc., Mass.
INVESTIGATION OF NEW MICROWAVE METHODS AND A MODIFIED STANDARD METHOD FOR SOLIDS ANALYSES Technical Progress Report, Apr. - Dec. 1981

Lawrence K. Wang, David Barris, Paul Milne, and Michael Mulloy 30 Aug. 1982 16 p refs Sponsored in part by Krofta Engineering Corp.
(PB83-124644; LIR/01-82/6) Avail: NTIS HC A02/MF A01 CSCL 07D

New Microwave Methods and a Modified Standard Method are introduced and experimentally evaluated based on prepared synthetic water samples containing known amounts of solids. The new microwave technique involves the use of a programmable microwave oven, and is comparable to, but requires less time than the APHA/AWWA/WPCF Standard Method for suspended solids determination. Total solids analysis by microwave can be performed in approximately one fifth the time of Standard Method procedure. The Modified Standard Method procedure for suspended solids analysis uses a conventional convection drying oven, an 11-cm diameter filter pad, and an 11-cm diameter buchner funnel, is equally accurate, and is as time-consuming as the real Standard Method procedure. GRA

N83-22378# GKSS-Forschungszentrum Geesthacht (West Germany).
FILTRATION TECHNIQUES FOR REVERSE OSMOSIS
K. G. Reinhardt and H. J. Mueller Nov. 1982 32 p refs Transl. into ENGLISH of the mono. "Filtrationsverfahren fuer Umkehrosmoseanlagaen" West Germany, 1980 32 p
(PB83-124685; GKSS-80/E/37) Avail: NTIS HC A03/MF A01 CSCL 07D

Filtration techniques for reverse osmosis pretreatment systems and methods for mathematical modelling and testing of filters as well as for determining concentration and particles size distribution of suspended solids are reviewed. The sensitivity of turbidity measurements can be increased by compensating stray light which originates from the cuvette walls so that very low contents of suspended solids can be measured as accurately as by the silt density index method. The latter, however, is better suited for predicting membrane behavior. GRA

N83-22379# Lenox Inst. for Research, Inc., Mass.
PRINCIPLES AND KINETICS OF OXYGENATION-OZONATION (OXYOZOSYNTHESIS (TRADEMARK)) WASTE TREATMENT SYSTEM Research Progress Report, Oct. 1980 - Sep. 1982
Lawrence K. Wang 30 Sep. 1982 149 p refs Sponsored in part by Blandford Fund
(PB83-127704; LIR/9-82/4A) Avail: NTIS HC A07/MF A01 CSCL 07D

The newly developed oxygenation-ozonation (Oxyozosynthesis (tm)) waste treatment systems are introduced which consist of a wet well for flow equalization and pH adjustment, a Hyperbaric reactor for oxygenation-ozonation, a flotation clarifier for degasification and solid-water separation, and a filter belt press for final sludge dewatering. Special emphasis is placed on investigating the theory, kinetics and disinfection effect of ozonation and oxidation. Topics include: formation and generation of ozone, state-of-the-art ozonators, theories of ozonation and oxidation, case histories, Oxyozosynthesis process description and discussion, etc. Based on extensive literature review and actual field investigations, advantages and disadvantages of the two new process systems are concluded. GRA

N83-22380# SRI International Corp., Menlo Park, Calif. Membrane Separation Program.
DEVELOPMENT AND DEMONSTRATION OF A REVERSE-OSMOSIS ENERGY-RECOVERY DEVICE Final Report
Gerry B. Andeen and Jeffrey C. Eid Jun. 1982 44 p refs (Contract DI-14-34-0001-1403)
(PB83-108605; W83-00256; OWRT-C-00146-D(1403)(1)) Avail: NTIS HC A03/MF A01 CSCL 07D

An energy recovery device for a seawater reverse osmosis (RO) system was designed, fabricated, and tested. The device, comprised of a valving system, uses waste streams from an RO system to drive a pump which, in turn, sends additional feed flows to the RO elements. Test data demonstrated that efficiencies exceeding 95% can be expected, and, hence, energy consumption in a seawater RO desalination system can be decreased by 50%. Further, conversion may be decreased from 30% in order that membrane life is extended, and the size of the main pump and prime mover can be reduced by 50%. The device was subjected to almost 1000 hours (175,000 cycles) of testing, simulating its operation in a 4800 gallon/day seawater system, producing an outlet pressure of over 850 lbs/sq in for an inlet pressure of 750 lbs/sq in. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N83-22381# British Library Lending Div., Boston Spa (England).
INFLUENCE OF SALT COMPOSITION ON THE KINETICS OF MAGNETITE FORMATION, ITS MAGNETIC SUSCEPTIBILITY AND MECHANICAL DEHYDRATION
I. A. Vainshtein, V. I. Konvisar, L. D. Klenysheva, and H. F. Khyoros 7 Jan. 1983 8 p refs Transl. into ENGLISH from Zh. Prikl. Khim. (USSR), v. 55, no. 1, 1982 p 133-138
(BLL-WH-534-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of salt (chloride or sulphate), of divalent iron and of the nature of the precipitating agent (alkali, ammonia water or lime milk) and also of the presence of cations of various metals (Ni, Mn, Mg, Ca, Zn, Al, Co and Ba) on the kinetics of magnetite formation, on its magnetic properties and its dehydration is studied. The criteria for the selection of the listed cations, raw material salts and precipitating agents were that they should be of practical interest in the technological processing of iron containing solutions for magnetite production, in the production of ferrites and iron oxide pigments, in the neutralization of waste waters (e.g., from the etching of metals) and in titanium dioxide production, etc. S.L.

N83-22382# British Library Lending Div., Boston Spa (England).
CORROSION-RESISTANT STEELS AND ALLOYS
E. A. Ulyanin 1982 7 p Transl. into ENGLISH from Stal (USSR), 1981 p 69-70
(BLL-M-26867-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The main types of corrosion encountered in steels and non-ferrous alloys are reviewed. The corrosion characteristics of nickel base alloys and of structures of steels of the austenitic, austenitic-ferritic and austenitic-martensitic classes are discussed. Data are given on the properties of 39 steels and eight non-ferrous alloys. Author

N83-22383# British Library Lending Div., Boston Spa (England).
EXPERIENCE IN COMBINED MECHANIZATION OF CONDITIONING AND FINISHING ALLOY METAL
N. V. Stetsenko and I. F. Yadlovskii 20 Dec. 1982 7 p Transl. into ENGLISH from Stal (USSR), v. 12, 1981 p 51-53
(BLL-M-26864-(5825.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The measures adopted since the 50's at the Dneprospetsstal works for mechanizing and automating the conditioning, finishing and non-destructive inspection of rounds are described. The first two-tier flow line incorporating these measures for 80-180 mm diameter rounds, and the second such flow line for 45 to 110 mm rolled section are also described. This mechanized the work performed by 168 skilled men in the finishing department and made 86 men available for alternative employment within the works. The resultant economy was equivalent to 500 thousand rubles. Author

N83-22384# British Library Lending Div., Boston Spa (England).
PRECIPITATION BEHAVIOUR OF THE TITANIUM-STABILIZED STEEL 15 PERCENT Cr-15 PERCENT Ni-1 PERCENT Mo-Ti-B (DIN MATERIAL NO. 1.4970)
A. F. Padilha, G. Schanz, and K. Anderko 17 Jan. 1983 33 p refs Transl. into ENGLISH from J. of Nucl. Mater. (Netherlands),

v. 105, 1982 p 77-92
Avail: British Library Lending Div., Boston Spa, Engl.

The precipitation behavior of a 15% Cr-15% Ni-Mo-Ti-B austenitic stainless steel was studied by means of various complementary metallurgical investigations over prolonged periods of time (2 min-12000 h) and within the temperature range of 823-1653 K (550-1380 C). Three heats with varying boron content (30-100 ppm) and varying Ti/C-ratio (3.7-5.1) were examined. Primary precipitates were identified as Ti(N, C), Ti2(S, C) and (Ti, Mo)C and their structure, composition, metallographic features (amount, shape, size, color, distribution and expitaxial growth) and thermal stability were studied. After solution heat treatment (1403 K) or additional cold working (15%) secondary precipitates were identified as (Ti, Mo)C, M23C6 and Cr, Fe)2B. Time-temperature-precipitation diagrams for the secondary phases were determined and the precipitation behavior was studied in detail. Cold working or creep loading did not cause the occurrence of new phases, but had a remarkable influence on the precipitation kinetics. Recovery and recrystallization were also examined.

Author

N83-22385# British Library Lending Div., Boston Spa (England).
CONTINUOUS IONISATION DE-SCALING METHOD FOR METALS
Chobee Taguchi 7 Dec. 1982 4 p Transl. into ENGLISH of Japanese Patent no. 52-73466 (20 Jun. 1977)
(BLL-OA-Trans-1965-(6196-3)) Avail: British Library Lending Div., Boston Spa, Engl.

A descaling method comprised of continuous elimination of scale from metal by glow discharge, in a vacuum chamber is described. A gas having reducing properties such as hydrogen, carbon monoxide, methane, etc. is used. S.L.

N83-22386*# National Aeronautics and Space Administration, Washington, D. C.
LONG-TERM PREDICTIVE CAPABILITY OF EROSION MODELS
P. Veerabhadra and Donald H. Buckley 1983 19 p refs Presented at 7th Conf. of Fluid Machinery, Budapest, 13-16 Sep. 1983; sponsored by the Scientific Society of Mechanical Engineers
(NASA-TM-83316; E-1543; NAS 1.15:83316) Avail: NTIS HC A02/MF A01 CSCL 11F

A brief overview of long-term cavitation and liquid impingement erosion and modeling methods proposed by different investigators, including the curve-fit approach is presented. A table was prepared to highlight the number of variables necessary for each model in order to compute the erosion-versus-time curves. A power law relation based on the average erosion rate is suggested which may solve several modeling problems. M.G.

N83-22387*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROGRESS TOWARD DETERMINING THE POTENTIAL OF ODS ALLOYS FOR GAS TURBINE APPLICATIONS
Robert L. Dreshfield, George Hoppin, III (Garrett Turbine Engine Company, Phoenix, Ariz.), and Keith Sheffler (Pratt and Whitney Aircraft Company, East Hartford, Conn.) 1983 16 p refs Presented at Frontiers of High Temperature Mater. II, London, 22-25 May 1983; sponsored by the International Nickel Company
(NASA-TM-83332; E-1579; NAS 1.15:83332) Avail: NTIS HC A02/MF A01 CSCL 11F

The Materials for Advanced Turbine Engine (MATE) Program managed by the NASA Lewis Research Center is supporting two projects to evaluate the potential of oxide dispersion strengthened (ODS) alloys for aircraft gas turbine applications. One project involves the evaluation of Incoloy (TM) MA-956 for application as a combustor liner material. An assessment of advanced engine potential will be conducted by means of a test in a P&WA 2037 turbofan engine. The other project involves the evaluation of Inconel (TM) MA 6000 for application as a high pressure turbine blade material and includes a test in a Garrett TFE 731 turbofan engine. Both projects are progressing toward these engine tests in 1984.

Author

N83-22388*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CREEP TESTING OF FOIL-GAGE METALS AT ELEVATED TEMPERATURE USING AN AUTOMATED DATA ACQUISITION SYSTEM
Linda B. Blackburn Mar. 1983 23 p refs
(NASA-TM-84634; NAS 1.15:84634) Avail: NTIS HC A02/MF A01 CSCL 11F

A method is being developed to obtain creep data on foil gage metals at elevated temperatures using an automated data acquisition system in conjunction with a mechanically counter balanced extensometer. The automated system components include the Hewlett-Packard (HP) 9845A desktop computer, the HP 3455A digital voltmeter and the HP 3495A scanner. Software for test monitoring and data collection was developed; data manipulation, including curve plotting was done with a HP regression analysis software package. Initial creep tests were conducted on .003 in. thick foil specimens of Ti-6A1-4V at temperatures of 800 F and 1000 F and at stress levels of 25 ksi and 45 ksi. For comparison, duplicate tests were run on .049 in. thick specimens sheet of the same alloy. During testing, the furnace and specimen temperature, bridge voltage, strain and load output were automatically monitored and recorded at predetermined intervals. Using the HP regression analysis program, recorded strain output was plotted as a function of time. These resultant creep curves indicate that, under similar conditions of temperature and stress, foil gage specimens exhibit a higher creep rate than sheet specimens. S.L.

N83-22389*# IIT Research Inst., Chicago, Ill.
CREEP-RUPTURE BEHAVIOR OF 6 CANDIDATE STIRLING ENGINE IRON-BASE SUPERALLOYS IN HIGH PRESSURE HYDROGEN. VOLUME 1: AIR CREEP-RUPTURE BEHAVIOR Final Report
S. Bhattacharyya Dec. 1982 128 p refs
(Contracts DEN3-217; DE-AI01-77CS-51040)
(NASA-CR-168071; NAS 1.26:168071; IITRI-M06061-38) Avail: NTIS HC A07/MF A01 CSCL 11F

Four wrought alloys (A-286, IN 800H, N-155, and 19-9DL) and two cast alloys (CRM-6D and XF-818) were tested to determine their creep-rupture behavior. The wrought alloys were used in the form of sheets of 0.89 mm (0.035 in.) average thickness. The cast alloy specimens were investment cast and machined to 6.35 mm (0.250 in.) gage diameter. All specimens were tested to rupture in air at different times up to 3000 h over the temperature range of 650 C to 925 C (1200 F to 1700 F). Rupture life, minimum creep rate, and time to 1% creep strain were statistically analyzed as a function of stress at different temperatures. Temperature-compensated analysis was also performed to obtain the activation energies for rupture life, time to 1% creep strain, and the minimum creep rate. Microstructural and fracture analyses were also performed. Based on statistical analyses, estimates were made for stress levels at different temperatures to obtain 3500 h rupture life and time to 1% creep strain. Test results are to be compared with similar data being obtained for these alloys under 15 MPa (2175 psi) hydrogen. A.R.H.

N83-22390*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FRICTIONAL AND MORPHOLOGICAL CHARACTERISTICS OF ION PLATED SOFT, METALLIC FILMS
Talivaldis Spalvins and Bruno Buzek 1981 14 p refs Presented at the Intern. Conf. on Metall. Coatings, San Francisco, 6-10 Apr. 1981 Announced in AIAA as A81-38066
(NASA-TM-81723; E-760; NAS 1.15:81723) Avail: NTIS HC A02/MF A01 CSCL 11F

Ion plated metallic films in contrast to films applied by other deposition techniques offer a lower friction coefficient, longer endurance lives and exhibit a gradual increase in friction coefficient after the film has been worn off. The friction coefficients of metallic films are affected by the degree of adherence, thickness and nucleation and growth characteristics during ion plating lead to a

fine, continuous crystalline structure, which contributes to a lower friction coefficient. Author (IAA)

N83-22391# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.
THE MULTIAXIAL DEFORMATION AND FRACTURE BEHAVIOR OF TI ALLOYS Annual Technical Progress Report, 1 Oct. 1981 - 30 Sep. 1982
D. A. Koss Nov. 1982 18 p refs
(Contract N00014-76-C-0037; NR Proj. 421-091)
(AD-A122594) Avail: NTIS HC A02/MF A01 CSCL 11/6

Progress is reviewed for a research program which has examined the multiaxial deformation and fracture behavior of Ti alloys, particulary as influenced by impurities such as hydrogen and by microstructural defects such as porosity. The studies range from experimental and analytical modeling of critical fracture processes to structure-property studies of both wrought material in the form of sheet and powder fabricated material in bar form. Specifically the program has studied: (1) the modeling of ductile fracture through an examination of the deformation and fracture at isolated holes in plane-strain tension; (2) the deformation and fracture of P/M Ti and Ti-6Al-4V containing porosity; (3) the influence of hydrogen on the multiaxial deformation and fracture behavior of beta-phase (bcc) Ti-30V and alpha (hcp)-beta Ti-6Al-4V; and (4) the theory of localized necking of sheet at negative minor strains. GRA

N83-22392# Naval Air Development Center, Warminster, Pa.
THE DISPLACEMENT OF WATER FROM A STEEL SURFACE Aircraft and Crew Systems Technology Directorate.
Charles R. Hegedus 8 Nov. 1982 71 p refs
(WF61542001)
(AD-A122595; NADC-82194-60) Avail: NTIS HC A04/MF A01 CSCL 11/6

A quantitative test to evaluate liquid compounds for their ability to displace water droplets from a steel surface has been developed and a study of the water displacement mechanism has been made. The test method consists of placing water droplets onto an inclined steel surface, followed by the application of a test agent. The agent flows down the surface, contacting the water drops. The water may either remain on the specimen or be displaced. The specimen is then immersed in methanol which absorbs residual water on the specimen. The methanol is then analyzed for water content, yielding a quantitative result for water displacement. Five materials have been evaluated. Two silicone alkyd compounds were found to be good water displacers. A third silicone alkyd compound was found to be a poor displacer at low angles but effective at higher angles. An acrylic and an epoxy coating were found to be poor water displacers. Author (GRA)

N83-22393# Pennsylvania State Univ., University Park. Applied Research Lab.
THE EFFECTS OF HOT ISOSTATIC PRESSING ON MICROSTRUCTURE AND PROPERTIES OF SINTERED LEAD ZIRCONATE TITANATE
Kevin G. Ewsuk 30 Nov. 1982 75 p refs
(Contract N00024-79-C-6043)
(AD-A123527; ARL/PSU/TM-82-238) Avail: NTIS HC A04/MF A01

The effects of hot isostatic pressing on the physical and electrical properties of sintered lead zirconate titanate are presented. Hot isostatic pressing for short times (< 1 hour) with low applied pressures (6.9 to 20.7 MPa) at 1300 C is shown to produce lead zirconate titanate with a higher density than that obtained by conventional sintering techniques. Densification is shown to occur without an appreciable change in grain size. Localized microstructural inhomogeneities observed after pressing indicate the migration of a $PbTiO_3$ rich lead zirconate titanate liquid to the pores. The rapid initial increase in density and shrinkage of macropores indicates that rearrangement and/or solution-precipitation initially control densification during hot isostatic pressing. A decreased rate of macropore shrinkage for extended pressing times indicates that solid state diffusion controls the later stage of pore shrinkage. B.G.

N83-22394# Science Applications, Inc., La Jolla, Calif.
MEASUREMENT OF OXYGEN CONTAMINATION IN TITANIUM ALLOY INGOTS BY FAST NEUTRON ACTIVATION ANALYSIS Final Technical Report
Adel Abusamra 12 Mar. 1982 23 p refs
(Contract N00014-81-C-2642)
(AD-A123909; SAI-018-82-064LJ) Avail: NTIS HC A02/MF A01 CSCL 11/6

In this report, the determination of oxygen content of titanium alloy - 6211 - will be demonstrated with a great deal of accuracy and reliability. The ultimate goal is to develop a safe and reliable portable unit that can measure oxygen levels in titanium or metallic welds, and indicate whether to accept such a weld or reject it based on its oxygen content. GRA

N83-22395# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
EFFECTS OF TEMPERING TREATMENT ON TENSILE, HARDNESS, AND CHARPY IMPACT PROPERTIES OF MODIFIED 9 Cr-1 Mo STEEL
V. K. Sikka, R. E. McDonald, G. C. Bodine, and W. J. Stelzman Oct. 1982 42 p refs
(Contract W-7405-eng-26)
(DE83-002586; ORNL/TM-8425) Avail: NTIS HC A03/MF A01

The effects of tempering temperature and time on the tensile properties and hardness of modified 9 Cr-1 Mo steel at room temperature and on its Charpy impact energy at room temperature and at 2040C are studied. Effects of postweld heat treatment on room-temperature tensile properties were also investigated, and tensile data at elevated temperatures were obtained for selected tempering conditions. The room-temperature tensile properties (strength and ductility), hardness and Charpy impact energy were fitted to a Holloman-Jaffe (HJ) parameter with an optimized constant of 22.3. This parameter allows the trade-off of tempering temperature and time to obtain the desirable properties. The same parameter was also suitable for obtaining the effects of post-weld heat treatment on tensile properties. The effects of specimen size and full-size tubular specimens on tensile properties are presented. The yield and ultimate tensile strengths were plotted as functions of hardness. Optical and scanning electron micrographs showed similar microstructures in specimens subjected to tempering conditions producing the same value of the HJ parameter. DOE

N83-22396# Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
INVESTIGATION OF VANADIUM AND HOT CORROSION RESISTANCE OF CHROMIUM AND SILICON BASE COATING SYSTEMS Annual Report, 21 Sep. 1981 - 20 Sep. 1982
R. H. Barkalow Oct. 1982 11 p refs
(Contract DE-AC06-79ET-15322)
(DE83-003280; DOE/ET-15322/T5; FR-16634) Avail: NTIS HC A02/MF A01

The objective of this program is the identification of advanced overlay coating compositions capable of resisting both the hot corrosion and ash erosion effects due to vanadium, sulfur, and alkali metals in low-grade oils as well as the oxidation/interdiffusion degradation expected to result from cleaner but hotter burning coal-derived liquids. Toward this objective, a program of furnace and burner rig testing was devised to investigate the behavior of the following types of alloys in Na_2SO_4, V_2O_5, and mixed salt hot corrosion: Ni-Cr-Si alloys of varying Cr and Si content; quaternary and active element additions to Ni-Cr-Si; Cr-base alloys; and Si-34Cr-23Ta. The tests were designed to provide fundamental information about the degradation mechanism and relative resistance versus the major hot corrosion variables (alloy composition, temperature, type and amount of salt, sulfur trioxide in the gaseous environment), with the ultimate goal of identifying systems and compositions suitable for further alloy and process development. DOE

N83-22397# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ON FUNDAMENTALS OF SLIDING WEAR IN STEELS
William J. Salesky Nov. 1982 129 p refs
(Contract DE-AC03-76SF-00098)
(DE83-004185; LBL-15164) Avail: NTIS HC A07/MF A01

Metal composition and microstructure have a significant affect on the degree of wear. The strains produced during sliding wear exceed 5.5 true shear strain. Debris in ferrous materials particles form at a critical shear strain of 5-6. Wear particle formation in ferrous metals is associated with dislocations structures. Cracks initiate at or around dislocation cell boundaries, second phase particles, or inclusions. Crack propagation typically occurs along cell boundaries. Sliding wear debris of ferrous materials are pyrophoric, for which oxidation occurs during platelet separation from the substrate. The degree of wear particle oxidation is dependent on the availability of oxygen, the extent of deformation, the rate of heat removal, and the specific area of the wear particle. DOE

N83-22398# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
LOAD-RELAXATION STUDIES OF 2 1/4 Cr - 1 Mo STEELS
Lin-Xi Li, John Wanagel, and Che-Yu Li 30 Nov. 1982 31 p refs
(Contract DE-AC02-83ER-12038)
(DE83-004496; DOE/ER-12038/6) Avail: NTIS HC A02/MF A01

Load relaxation tests were performed on Cr-1 Mo steels of two different heat treatments. The experimental data are presented in the form of logarithmic stress versus logarithmic nonelastic strain rate curves. A state variable theory was used to discuss the experimental results. DOE

N83-22399# Drexel Univ., Philadelphia, Pa. Dept. of Materials Engineering.
STRAIN HARDENING AND DUCTILITY OF IRON: AXISYMMETRIC VS. PLANE-STRAIN ELONGATION Final Report
Harry C. Rogers May 1982 40 p refs
(Contract DE-AC02-76ER-04072)
(DE83-004513; DOE/ER-04072/1) Avail: NTIS HC A03/MF A01

The strain hardening of interstitial-free iron at high strain in plane-strain elongation (strip drawing) falls increasingly below that of drawn iron wires at true strains (epsilon = ln l/l sub o) above 2, going through zerostrain hardening at epsilon =3 and becoming strongly negative thereafter. High-resolution selected-area electron diffraction maps show no textural instability or change in orientation associated with the shear bands. The only instability seen in these shear bands is microstructural. Flow properties of Fe-0.17 w/o Ti were characterized for monotonic plane-strain elongation, monotonic axisymmetric elongation, and completely reversed deformation. Strip drawn wire (i.e., initially wire drawn to epsilon = 3.3, then converted to a rectangular cross section and strip drawn by another epsilon = 2.6, a total elongation of epsilon = 5.9) shows good deal of strain hardening during the strip drawing in spite of the fact that it is now stronger than the monotonically drawn strip at the same total elongation. DOE

N83-22400# Sandia Labs., Albuquerque, N. Mex.
CHARACTERISTICS OF BARRIER ANODIZED COATINGS ON 6061 ALUMINUM
J. K. G. Panitz and D. J. Sharp 1982 5 p refs Presented at Metallurg. Coatings and Process Technol. Conf., San Diego, Calif., 4 Apr. 1982
(DE82-011944; SAND-82-0692C; CONF-820412-2) Avail: NTIS HC A02/MF A01

The characteristics of anodic coatings on 6061 aluminum are evaluated. These coatings were grown using a high voltage (950 V), low current density (1 to 2 mA sq cm, high resistivity (45 to 75 k omega cm) process, in an electrolyte consisting of a solution of ammonium tartrate in ethanol. Coating properties which were subsequently characterized include thickness, density, morphology, entrained and adsorped impurities, dielectric constant, breakdown strength, and leakage current. A comparison of the coatings on 6061 aluminum with coatings grown using similar conditions on commercially pure 1100 aluminum indicates that the alloying components in 6061 aluminum affect subsequent coating morphology and dielectric properties. The coatings displayed useful dielectric properties. The fact that these coatings were grown on 6061 aluminum, which is a common industrial alloy used because of its relatively high strength and machinability, may recommend these coatings for a variety of practical applications. DOE

N83-22401# Sandia Labs., Albuquerque, N. Mex.
EVALUATION OF PROCESS PARAMETERS USED IN THE NON-AQUEOUS ANODIZATION OF ALUMINUM ALLOYS
J. K. G. Panitz, D. J. Sharp, and D. E. Peterson Feb. 1982 88 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012063; SAND-81-0354) Avail: NTIS HC A05/MF A01

The effects are evaluated for systematic variations in high voltage anodization process parameters including electrolyte temperature, resistivity, and anodic current density. Samples of two types of aluminum alloy; 1100, and 6061-T6, with two types of surface texture, were anodized. The electrolyte consisted of a nonaqueous solution of ammonium tartrate and ethanol. Properties of the resultant coatings evaluated included anodic oxide growth rate, thickness, density, morphology, entrained impurities, capacitance, dissipation factor, breakdown strength, defect probability, and leakage current. DOE

N83-22402# Knolls Atomic Power Lab., Schenectady, N. Y.
CORROSION RATES AND EVALUATIONS OF STRUCTURAL MATERIALS ON THE NORTH ATLANTIC CONTINENTAL RISE
H. Suss, S. I. Williams, C. H. Barth, and R. B. Sehldon Aug. 1982 26 p refs
(Contract DE-AC12-76SN-00052)
(DE83-004431; KAPL-4135) Avail: NTIS HC A03/MF A01

Initial and steady-state corrosion rates were determined for carbon steel, low-alloy steel, series 300 stainless steels and Ni-Cr-Fe Alloy 600 at two stations in the Northwestern Atlantic Ocean. Corrosion specimens were deployed by submersibles at depths of 3000 and 3700 meters for up to three years. The experimental conditions were flowing, semistagnant, and stagnant seawater as well as complete burial in deep-ocean sediments. Mean steady-state corrosion rates for carbon and low-alloy steels ranged from 0.02 to 2.7 mils per year in the various seawater environments. Steady-state corrosion rates in the sediments were more variable and resulted in the highest observed rates of 6.40 per year for carbon steel and 6.42 mils per year for HY-80 low alloy steel. Galvanic corrosion of carbon steel in contact with stainless steel resulted in significant accelerated corrosion of the carbon steel only in the flowing seawater and sediment environments. Corrosion rates for the corrosion-resistant alloys, including the stainless steels and Alloy 600, were extremely low averaging 0.0001 mil per year for the longer exposures. Some localized pitting and underdeposit corrosion were observed. DOE

N83-22403# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
L EDGE-ABSORPTION SYSTEMATICS OF SOME TRANSITION-METAL (Pd, Ag), MAIN-GROUP-METAL (Sn, In), AND IONIC (CsI) SYSTEMS
T. K. Sham 1982 3 p refs Presented at the Intern. Conf. EXAFS and Near Edge Structures, Frascati, Italy, 13 Sep. 1982 Sponsored in part by NSF and NIH
(Contract DE-AC02-76CH-00016)
(DE83-000243; BNL-31863; CONF-820957-2) Avail: NTIS HC A02/MF A01

The L-edge absorption of Pd, Ag, Sn, In, and CsI was measured to study the density of states and the unoccupied d-states. DOE

N83-22404# Ames Lab., Iowa. Dept. of Chemical Engineering.
STUDY OF THE ELECTROWINNING OF COPPER USING A FLUIDIZED-BED ELECTROCHEMICAL REACTOR M.S. Thesis
David Lloyd Felker Dec. 1982 141 p refs
(Contract W-7405-eng-82; Grant DI-MS-G1-106002)

(DE83-004854; IS-T-1028) Avail: NTIS HC A07/MF A01

The use of a fluidized bed electrochemical reactor for the recovery of copper from aqueous solutions was studied. Electrolyte solutions containing 0 to 8 g/l copper, 0 to 8 q/l iron and 200 g/l sulfuric acid were used. Porous diaphragms were used to separate the cathode and anode regions. The current efficiency, energy consumption rate and volumetric reaction rate were calculated for the experimental conditions. When the catholyte and anolyte are circulated from a common reservoir and iron (II) is present in the electrolyte, the energy consumption rate exhibits a minimum value of about 1.5 kWh/lb a volumetric reaction rate (VRR) of about 100 lb Cu/m(3) h. When the anolyte and catholyte are separated, the energy consumption rate rises linearly with VRR, being about 1 kWh/lb Cu at 100 lb Cu/m(3) h (this is roughly 2x the VRR of a conventional electrowinning cell). The optimum bed width in the direction of current flow was about 2 cm. A mathematical model which takes into account the dissolution of copper by ferric ion and oxygen is shown to explain the changes in the current efficiency and the VRR with current density seen in most of the experiments. DOE

N83-22405# Bettis Atomic Power Lab., Pittsburgh, Pa.

OCEAN CORROSION EXPERIMENT: RESULTS FROM ONE YEAR OF EXPOSURE

R. H. Giffen Aug. 1982 83 p refs

(Contracts DE-AC11-76PN-00014; N00024-79-C-4026)

(DE83-004758; WAPD-TM-1510) Avail: NTIS HC A05/MF A01

Five different structural alloys were exposed to the environment at the bottom of the Pacific Ocean at a depth of 5860 meters for one year. Results show that the amount of corrosion products released over one year is less than that reported elsewhere by factors of four for low alloy steels and 30 for corrosion resistant alloys. These differences are attributed to oxygen concentration, water temperature, lower biological activity, and scaling. On the average, low alloy steels released corrosion products equivalent to 1.05 mils of metal compared to 4.4 mils in the literature. Similarly, corrosion resistant alloys released corrosion products equivalent to 0.04 mil of metal compared to 1.1 mils in the literature. DOE

N83-22406# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.

CORRELATION BETWEEN STRESS-TO-RUPTURE DATA AND LOAD-RELAXATION DATA OF 2 1/4 Cr-1 Mo STEELS

L. S. Li, R. L. Keusseyan, J. Wanagel, and C. Y. Li 30 Nov. 1982 40 p

(Contract DE-AC02-82ER-12038)

(DE83-004497; DOE/ER-12038/5) Avail: NTIS HC A03/MF A01

Load relaxation data of 2 1/4 Cr-1 Mo steels were obtained as a function of temperature. These data, in the form of logarithmic stress vs logarithmic nonelastic strain rate plots, are found to be related to the stress to rupture data. This relation suggests a possible method of data correlation and extrapolation for the stress to rupture properties. DOE

N83-22407# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

THERMAL-CONVECTION-LOOP STUDY OF THE CORROSION OF Fe-Ni-Cr ALLOYS BY MOLTEN NaNo/SUB 3-KNO/SUB 3

P. F. Tortorelli and J. H. DeVan Dec. 1982 42 p refs

(Contract W-7405-eng-26)

(DE83-004228; ORNL/TM-8298) Avail: NTIS HC A03/MF A01

The corrosion of Fe-Ni-Cr alloys by draw salt (60 wt % NaNO3-40 wt % KNO3) is studied with thermal convection loops of alloy 800 and types 304L and 316 stainless steel. The main corrosion processes at 6000 C and below were the growth of thin oxide scales and the dissolution of chromium by the salt. Spallation of oxide layers occurred on type 304 stainless steel specimens at intermediate temperatures. Results indicated relatively low corrosion rates (< 13 (SIGMA)m/year in most cases) for temperatures of 6000 C and less. Corrosion of type 316 stainless steel was greatly accelerated when the maximum loop temperature was raised to 6200 C. It therefore appears that 6000 C may be the limiting temperature for use of the above alloys in draw salt. DOE

N83-22408# Mound Lab., Miamisburg, Ohio.

CHEMICALLY-POLISHED STAINLESS STEEL TUBING FOR TRITIUM SERVICE

J. T. Gill and W. E. Moddeman 1982 18 p refs Presented at the 29th Natl. Symp. on Am. Vacuum Soc., Baltimore, 16 Nov. 1982

(Contract DE-AC04-76DP-00053)

(DE83-000039; MLM-3007-OP; CONF-821111-6) Avail: NTIS HC A02/MF A01

The need for low carbon and protium inventory at the surfaces of tritium process vacuum components were demonstrated: radiolytic methane generation and hydrogen isotope exchange lead to contamination of the tritium gas. Significant lengths of small ID (less than 1/2') stainless steel tubing have, however, been difficult to procure or prepare in an organic free, low surface area state. Chemical flow polishing appears to be an appropriate method for preparation of such tubing. Three types of stainless steel (316) tubing - as-received (AR) from a supply house, chromatography grade (CG), and flow polished (FP) samples were investigated by profilometry, SEM, and AES. Surface roughness of the AR, CG, and FP samples were 38, 22, and 7 microinches RMS, respectively. Relative surface areas were approximately 10:10:1, as were relative total carbon inventories for the AR, CG, and FP surfaces, respectively. DOE

N83-22409# Illinois Univ., Urbana. Dept. of Physics.

AN ULTRASONIC STUDY OF TRAPPED HYDROGEN IN NIOBIUM Ph.D. Thesis

Kai-Feng Huang 1982 122 p refs

(Contract DE-AC02-76ER-01198)

(DE83-001127; DOE/ER-01198/1389) Avail: NTIS HC A06/MF A01

A review of all the available data (specific heat, internal friction, neutron scattering, channeling, thermal conductivity) on Nb-O-H or Nb-N-H systems, is first given. An eight-state tunneling model is proposed, and the properties of the system are developed. A comparison of the predictions of this model with the data is given, and the four parameters that describe the model are determined. A simple potential calculation is also performed to demonstrate the qualitative features of the model. Measurements have been made of ultrasonic attenuation and velocity in the Nb-O-H system as a function of temperature, frequency, polarization and isotope. In addition to the previously found stable peak, an additional peak is found when the specimen is cooled rapidly. The peak anneals at the same temperature as those found by Hanada in their resistivity quenching experiments, indicating that the quenched-in defect is an OH2 complex. An extension of the model is given to account for the relaxation. DOE

N83-22410# Sandia Labs., Albuquerque, N. Mex.

EFFECTS OF ION IMPLANTATION ON FRICTION AND WEAR OF STAINLESS STEELS

L. E. Pope, F. G. Yost, D. M. Folistaedt, J. A. Knapp, and S. T. Picraux 1982 15 p refs Presented at the Wear of Mater. Conf., Reston, Va., 11 Apr. 1982

(Contract DE-AC04-76DP-00789)

(DE82-022165; SAND-82-0979C; CONF-820483-1) Avail: NTIS HC A02/MF A01

Mechanically polished samples of 304, 15.5 PH and 440 C stainless steels and pure Fe were ion implanted to fluences of 2 x 10 to the 15th power Ti/sq mm (90 to 180 keV) and 2 x 10 to the 15th power C/sq mm (30 keV). The implantation profiles of the two elements extended to approximately 0.1 micrometers and approximately overlapped each other. The effects of normal load (Hertzian stresses in the range of 690 to 1840 MPa) on friction and wear were evaluated in the pin on disc configuration with no lubrication. Some 304 pins were used and are shown to give results similar to those previously reported for 440 C pins. Ion implantation reduces friction coefficients by up to 80% and decreases the maximum wear depths by up to 95%, but the magnitude of reductions depends on the material and the load conditions. Transfer of material containing Ti from the implanted plates to both 304 and 440 C pins was observed. A change in

wear mechanism was detected in the wear tracks as the load was increased; fine scale abrasive type parallel grooves were present at light loads while galling was observed at high loads. DOE

N83-22411# California Univ., Livermore. Lawrence Livermore Lab.
PLATING ON TITANIUM AND ZIRCONIUM
J. W. Dini and H. R. Johnson (Sandia Livermore National Lab.) 9 Sep. 1982 15 p refs Presented at the ASTM Conf. on Titanium and Zirconium in Ind. Appl., New Orleans, La., 21-23 Sep. 1982 (Contract W-7405-eng-48)
(DE82-022030; UCRL-87111; CONF-820955-1) Avail: NTIS HC A02/MF A01

Application of adherent coatings on titanium and zirconium alloys can be problematic because of the natural oxide surface film that readily reforms on these metals after being removed. However, is spite of this obstacle, procedures have been developed for applying adherent electroplates or vacuum coatings on these substrates. These methods were quantified by means of a ring shear test wherein cylindrical rods with thick coatings were forced through hardened steel dies. In addition to these data, some solid state bonding applications for titanium alloys and Zircaloy-2 are reviewed. DOE

N83-22412# Battelle Pacific Northwest Labs., Richland, Wash. Materials Characterization Center.
ASSESSMENT OF PREDICTIVE MODELS FOR THE FAILURE OF TITANIUM AND FERROUS ALLOYS DUE TO HYDROGEN EFFECTS Report, 17 Jun. - 15 Sep. 1981
T. F. Archbold, R. B. Bower, and D. H. Polonis Apr. 1982 98 p refs
(Contract DE-AC06-76RL-01830)
(DE82-014430; PNL-4157) Avail: NTIS HC A05/MF A01

A critical assessment was undertaken to determine the relevance and reliability of existing theoretical models and test methods for predicting the initiation and subcritical growth of cracks leading to fracture over prolonged periods under stress and in the presence of various chemical environments, especially those containing hydrogen. The evaluation of crack growth models for describing hydrogen-induced fracture is an important first step in establishing a confident basis for predicting the resistance to delayed failure of titanium and iron-base alloys from the results of relatively short time tests. The conditions for hydrogen embrittlement in these two classes of materials are quite different since delayed fracture in titanium alloys depends on hydride formation and fracture at the tips of preexisting flaws or cracks: whereas, iron-base alloys do not undergo hydride formation. The applicability of existing diffusion models for hydrogen embrittlement and the available test methods of fracture mechanics to these two conditions of hydrogen embrittlement are emphasized. DOE

N83-22413# Central Electrochemical Research Inst., Karaikudi (India).
CORROSION BULLETIN, VOLUME 2, NUMBER 5, SEPTEMBER 1982
K. S. Rajaagopalan, ed. Sep. 1982 41 p refs
(PB83-124487) Avail: NTIS HC A03/MF A01 CSCL 11F

Corrosion of steel embedded in concrete; prevention and cure; corrosion problems in electronic equipments - cast study; protection of steel structures under wet and dry conditions of a port; electrochemical methods of protection - cathodic protection-II; techniques for measuring corrosion rates-V foradaic destortion method; corrosion rate measuring meters - polarization resistance type corrosion of metals and alloys in nonaqueous corrosion research were discussed. GRA

N83-22414# Tennessee Technological Univ., Cookeville. Dept. of Civil Engineering.
FRACTURE PROPERTIES OF NODULAR IRON CASTINGS, GRADE 80-55-06 Final Report, Nov. 1981 - Oct. 1982
Dallas G. Smith and Kei-Peng Jen Oct. 1982 63 p refs Sponsored in part by McGraw-Edison Co., Buffalo, N.Y.
(PB83-128694; TTU-CE-82-1) Avail: NTIS HC A04/MF A01 CSCL 11F

The fracture mechanics properties of nodular iron, grade 80-55-06, were studied. The mechanical properties of the material were determined. Fracture toughness tests were conducted on 1 inch thick compact tension specimens and a conditional fracture toughness, K sub Q, was determined. Thirteen fatigue crack growth tests were conducted and the results plotted on log-log graphs. The dependence of the fatigue crack growth rate, da/dN, on stress intensity factor range, delta K, was determined for stress ratios of 0.1, 0.3, 0.5, and 0.7. Numerous scanning electron micrographs were made showing various features of the fatigue fracture surface. GRA

N83-22415# Swedish Inst. for Metal Research, Stockholm.
SWEDISH SYMPOSIUM ON NON-METALLIC INCLUSIONS IN STEEL
1981 467 p refs Symp. held at Stockholm, 27-29 Apr. 1981
(PB83-131292) Avail: NTIS HC A20/MF A01 CSCL 11F

Topics covered include: clean steel injection metallurgy and inclusion origin in a calcium treated steel; use of lime based powders; metallurgical control of inclusions; sulphide shape control; inclusion pattern of stainless steel subjected to powder injection treatment in the ladel; how to quantify steel cleanliness; the particle analysing scanning electron microscope applied to the study of non-metallic inclusions; transfer of two dimensional size distributions of inclusions to three dimensions; computer synthesis of microstructures in stereological analysis; how particles control ductile fracture during tensile testing and metal working operations; the effect of notches and non-metallaic inclusions on the fatigue properties of high strength steel; and the effect of Ca-treatment on the machinability of steel and inclusions and polishability. GRA

N83-22416# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
MEASUREMENT OF LOW CORROSION RATES: COMPARISON OF AC IMPEDANCE AND THIN LAYER ACTIVATION METHODS
D. E. Williams and J. Asher Jan. 1983 25 p refs
(AERE-R10477) Copyright. Avail: Issuing Activity

The very low corrosion rate (0.05 to 1 micron year) of 18Cr13Ni1Nb stainless steel in 7.8M HNO3 at room temperature was determined with some confidence in a period of a few days by the combination of AC impedance and a radiotracer technique, thin layer activation. Both techniques were taken to their limits. It is argued that the AC method gives an upper estimate for the corrosion rate whilst the tracer method gives a lower estimate. Application of the AC method requires an estimate of the Tafel parameter relating corrosion rate and polarization resistance: an approximate method, utilizing the variation of the apparent value of the polarization resistance with the amplitude of the AC signal, is given in this paper. The corrosion rate decreased steadily with time over the first few days of exposure of the polished steel surface to the acid. S.L.

N83-22417# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
MEASUREMENT OF DIFFUSIONAL CREEP IN AISI TYPE 316 STAINLESS STEEL: TECHNIQUE AND APPARATUS
C. M. Shepherd Dec. 1982 32 p refs
(AERE-R10690) Copyright. Avail: Issuing Activity

The background theory for interpreting creep data from helical spring specimens is summarized. Apparatus capable of utilizing the major advantage offered by these specimen is described. This equipment will enable diffusional creep mechanisms to be investigated which may be the dominant deformation mechanism under service conditions. Strain rate data in the range 10 to negative 12th power 1/s to 10 to the negative 8th power 1/s can easily be obtained. Examples of typical data from AISI type 316 stainless steel are included to illustrate the high sensitivity of the strain measurements and how they can subsequently be interpreted. Author

N83-22418# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
MICROSTRUCTURE OF THE SCALE FORMING ON DILUTE IRON-SILICON ALLOYS IN CARBON DIOXIDE
P. T. Moseley, G. Tappin, J. A. A. Crossley, and J. C. Riviere Nov. 1982 41 p refs
(AERE-R10697) Copyright. Avail: Issuing Activity

X-ray diffraction from the underside of the scale provided lattice parameter, strain and grain size measurements of the magnetite in the inner part of the duplex scale. Of these different sets of information, the grain size shows by far the most dramatic dependence on alloy composition. The presence of silicon in the alloy brings a reduction in the grain size of the inner scale of more than an order of magnitude when compared with the scale on pure iron. A dry stripping technique was developed which allows a thorough examination of the boundaries marking the inner and outer limits of the inner part of the scale. For the case of scales on Fe Si, it is found that the midscale interface, like that at the base of the scale, is marked by a local accumulation of silicon. The two silicon accumulations appear to be of sizes which are independent of time. These sizes are determined in the early stages of oxidation and do not change thereafter. A.R.H.

N83-22419# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
THE EFFECTS OF HEAT FLUX ON THE CORROSION OF HIGH PRESSURE BOILERS
L. Tomlinson and A. M. Pritchard Dec. 1982 30 p refs
(AERE-R10765) Copyright. Avail: Issuing Activity

The presence of a heat flux increases the metal surface temperature, and, where boiling occurs, can lead to the concentration of solutes present in the feedwater of high pressure boilers. In the absence of boiling, the increase in corrosion rate due to the presence of a heat flux should be small and related to the known activation energy of the process. In the nucleate boiling region, the increased surface temperature and mass transport to the wall can lead to the production of thicker coherent oxide films in the presence of soluble corrosion products with reverse solubility curves. Where defects are present in the surface of the boiler tube, or porous structures develop, enhanced boiling can occur, and corrosive salt concentrations many orders of magnitude greater than in the feedwater can be developed within them. Similar concentrations of salts may form where the tube surface becomes dry, at low steam qualities due to the effects of tube geometry on flow, or where the annular film dries out in a once through boiler. Impingement of droplets on the boiler tube wall beyond the dry out zone can also increase corrosion. Salts dissolved in superheated steam interact with the boiler wall and may become irreversibly incorporated in the growing oxide. The effects of different water chemistry regimes on these processes are outlined, and the value of radiotracers in studying salt concentration and metal corrosion under heat flux at high temperatures and pressures is shown. Author

N83-22420# United Kingdom Atomic Energy Authority, Harwell (England). Metallurgy Div.
INSPECTION OF MINERAL INSULATED THERMOCOUPLE CLOSURE AND JUNCTION WELDS BY METALLOGRAPHY
G. H. Broomfield Nov. 1982 13 p refs
(AERE-M3280) Copyright. Avail: Issuing Activity

Setting up the welding equipment for the production of junction and closure welds of mineral insulated thermocouple may be facilitated by using the shape and structure of the welds as a guide. Methods for preparation and etching of the necessary thermocouple sections are described, followed by an indication of the closure weld and junction weld shapes which are acceptable. Precautions which are necessary to reliably examine the sections of sheath exterior and conductor surfaces for corrosion or other attack are included. S.L.

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N83-22421# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
HIGH-TEMPERATURE MECHANICAL PROPERTIES OF CERAMICS Progress Report, 1 Jul. 1981 - Jun. 30 1982
R. Raj 1982 27 p refs
(Contract DE-AS02-77ER-04386)
(DE82-009110; DOE/ER-04386/5; COO-4386-5) Avail: NTIS HC A03/MF A01

Several fundamental aspects of high temperature mechanical behavior of ceramics (containing small amounts of a liquid phase) were studied. Cavitation, microcracking, and creep crack growth were formulated in terms of micro-mechanisms. Creep was studied in terms of a solution/precipitation transport mechanism. Experiments were done to measure the kinetics of crystal growth and dissolution from the liquid phase, and these data and the creep model was used to obtain quantitative agreement with experiment. Two types of materials, lithia-alumino-silicate beta-spodumene glass ceramic and magnesia fluxed hot-pressed silicon nitride were the subjects of experimental work. DOE

N83-22422*# IIT Research Inst., Chicago, Ill.
PLASMA-SPRAYED SELF-LUBRICATING COATINGS Final Report, 21 May 1979 - 3 Mar. 1982
H. H. Nakamura, W. R. Logan, and Y. Harada Washington May 1982 131 p refs
(Contract NAS3-21979)
(NASA-CR-3680; NAS 1.26:3680; IITRI-M06051-33) Avail: NTIS HC A07/MF A01 CSCL 11H

One of the most important criterion for acceptable commercial application of a multiple phase composition is uniformity and reproducibility. This means that the performance characteristics of the coat - e.g., its lubricating properties, bond strength to the substrate, and thermal properties - can be readily predicted to give a desired performance. The improvement of uniformity and reproducibility of the coats, the oxidation behavior at three temperature ranges, the effect of bond coat and the effect of preheat treatment as measured by adhesive strength tests, coating examination procedures, and physical property measurements were studied. The following modifications improved the uniformity and reproducibility: (1) changes and closer control in the particle size range of the raw materials used, (2) increasing the binder content from 3.2% to 4.1% (dried weight), and (3) analytical processing procedures using step by step checking to assure consistency. S.L.

N83-22423*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POLYIMIDES FORMULATED FROM A PARTIALLY FLUORINATED DIAMINE FOR AEROSPACE TRIBOLOGICAL APPLICATIONS
Robert L. Fusaro 1983 28 p refs Presented at the Ann. Meeting of the Am. Soc. of Lubrication Engr., Houston, Tex., 25-28 Apr. 1983
(NASA-TM-83339; E-1593; NAS 1.15:83339) Avail: NTIS HC A03/MF A01 CSCL 11H

Preliminary tribological studies on polyimides formulated from the diamine 2,2-bis [4-(4-aminophenoxy)phenyl] hexafluorapane (4-BDAF) indicate that polyimides formulated from this diamine have excellent potential for high temperature tribological applications. The dianhydrides used to make the polyimides were pyromellitic (PMDA) and benzophenonetetracarboxylic acid (BTDA). Friction and wear studies at 25 and 200 C indicate that polyimides formulated using 50 mole percent of the PMDA dianhydride and 50 mole percent of the BTDA dianhydride perform better than polyimides formulated solely with the BTDA dianhydride. Graphite fiber reinforced polyimide composites were formulated with the polyimide made from the BTDA dianhydride, both graphitic

and non-graphitic fibers were evaluated. Graphitic fibers produced better tribological results, since thin, flowing, 'layer-like' transfer films were produced which did not build-up with long sliding durations. Non-graphitic fibers did not produce this type of transfer. M.G.

N83-22424*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SYNTHESIS AND CHARACTERIZATION OF A POLYETHERSULFONEIMIDE
Harold D. Burks and Terry L. St.Clair Apr. 1983 27 p refs
(NASA-TM-84621; NAS 1.15:84621) Avail: NTIS HC A03/MF A01 CSCL 11G

Two similar polyimide systems were synthesized and characterized. The only structural difference was a sulfide linkage in the anhydride derived portion of the first system versus a sulfone linkage in the second. Their physical, mechanical, melt-flow and thermal properties were determined and also their resistance to some of the more common solvents. The flow properties of these polyimides indicate them to have potential for melt processability. Author

N83-22425# Council for Scientific and Industrial Research, Pretoria (South Africa). Production Engineering Advisory Service.
MINI-SEMINAR ON PLASTIC IN THE 1980'S
Mar. 1982 81 p Seminar held in Pretoria, Mar. 1982
(CSIR-TSD-0001/82; ISBN-0-7988-2357-7) Avail: NTIS HC A05/MF A01

The production of plastics is discussed. An overview of the South African plastics industry is given. The development of fiber reinforced plastic composites and their applications are discussed. The use of plastics in automobile manufacturing is discussed, as well as the industrial radiation processing of plastics and the use of plastics in the construction industry. Designing in plastics, with particular reference to the role of the mold designer is discussed. For individual titles, see N83-22426 through N83-22428.

N83-22426# Council for Scientific and Industrial Research, Pretoria (South Africa). National Mechanical Engineering Research Inst.
HIGH-DUTY FIBRE-REINFORCED PLASTICS
M. S. Hunt *In its* Mini-Seminar on Plastic in the 1980's Mar. 1982 19 p (For primary document see N83-22425 12-27)
Avail: NTIS HC A05/MF A01

An overview of the development and uses of fiber reinforced plastics is given. The structural performance of conventional materials such as steel; aluminium, and wood are compared with composite materials. Unidirectional composite materials are discussed. Woven cloth laminates, cross-plied laminates, and random mat laminates are discussed. The application of composite materials to helicopter tail rotor blades is discussed. R.J.F.

N83-22427# Council for Scientific and Industrial Research, Pretoria (South Africa).
INDUSTRIAL RADIATION PROCESSING OF PLASTICS
G. DeHollain (Contronics SA (Proprietary) Ltd.) *In its* Mini-Seminar on Plastic in the 1980's Mar. 1982 7 p (For primary document see N83-22425 12-27)
Avail: NTIS HC A05/MF A01

The improvement of plastics and rubbers by irradiation is discussed. Some applications of radiation processing are discussed. Wire and cable represents the most important application. The manufacture of shrinkable tubing and polyethylene foams are discussed. R.J.F.

N83-22428# Council for Scientific and Industrial Research, Pretoria (South Africa). Design Office.
DESIGNING IN PLASTICS, WITH PARTICULAR REFERENCE TO THE ROLE OF THE MOLD DESIGNER
A. S. Paterson *In its* Mini-Seminar on Plastic in the 1980's Mar. 1982 15 p (For primary document see N83-22425 12-27)
Avail: NTIS HC A05/MF A01

A specific approach to the design of plastic materials known as the total design concept is discussed. The three factors of product requirements, material requirements, and manufacturing process requirements must be constantly integrated and balanced. The role of the mold designer is discussed. Some specific machinery problems are discussed. R.J.F.

N83-22429# Rutgers Univ., Newark, N. J. High Pressure Research Lab.
PRESSURE-VOLUME-TEMPERATURE STUDIES OF A POLYURETHANE
D. L. Questad, K. D. Pae, J. I. Scheinbeim, and B. A. Newman 25 Nov. 1982 16 p refs
(Contract N00014-82-K-0608)
(AD-A122394; TR-2) Avail: NTIS HC A02/MF A01 CSCL 11/9

Experimental pressure-volume-temperature data for a polyurethane elastomer above Tg are fitted to equation of state theories. The cell and hole theories, as applied to polymer liquids, both represent the data fairly well for appropriate choice of P*, V*, and T*; the characteristic pressure, volume, and temperature scaling parameters, respectively. P*, V*, and T* are found to obey a semiempirical equation which holds for a large number of polymers, and, by fitting the data to the hole theory, it is found that the hole fraction, 1-y, can be used as an ordering parameter to describe the pressure dependence of Tg. Author (GRA)

N83-22430# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Polymer Branch.
INFLUENCE OF CURE ENVIRONMENT AND CURE TEMPERATURE ON FAILURE PROPERTIES OF ACETYLENE TERMINATED SULFONE Final Report, 1 Sep. - 30 Dec. 1981
C. Y-C. Lee, C. C. Kuo, and N. C. Lee Oct. 1982 29 p refs
(AF Proj. 2419)
(AD-A122383; AFWAL-TR-82-40988) Avail: NTIS HC A03/MF A01 CSCL 11/9

Air cure effects on the tensile and fracture behavior are studied with an acetylene terminated sulfone resin. It is found that in all instances, the air cure improves the mechanical properties. As much as 30% improvement can be attained depending on the extent of cure performed in the presence of air. The amount of improvement appears to depend on the thickness of the test specimens. Density measurements show different values for the air cure and the nitrogen cure specimens. Similar thickness dependency on the total air effect is also observed. The air effect is also affected by the stage of cure when the air is introduced. The effect is larger when air is introduced early in the cure. The results are consistent with the dynamic mechanical data and show the role of air diffusing into the sample in controlling the total improvement in mechanical properties. Tensile properties at different extents of cure are also measured. Those data indicated that at the initial cure stages, the mechanical properties of the resin are poor. Thus damage could be sustained by parts during the processing procedure if they were not handled properly at these stages. Author (GRA)

N83-22431# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
MICRO AND MACRO MECHANICS OF FRACTURE IN CERAMICS Interim Report, 1 Jan. - 31 Dec. 1982
A. G. Evans 30 Oct. 1982 364 p refs
(Contract N00014-81-K-0362)
(AD-A124025) Avail: NTIS HC A16/MF A01 CSCL 11/2

The reliability of ceramic materials has been studied by addressing problems concerned with toughness, surface damage and statistics. Toughening effects due to deflecting phases have been studied and shown to yield substantial toughening where rod shaped phases are used. The surface damage created by machining and implications for NDE have also been addressed, with special emphasis on the role of the residual stresses. Finally, statistical aspects of structural reliability have been studied, both by examining the role of multiple flaw populations on fracture predictability and by quantitatively correlating thermal shock statistics with mechanical strength distributions. Author

N83-22432# Monsanto Research Corp., Miamisburg, Ohio. Mound Facility.
PARTIAL CHARACTERIZATION OF ALUMINA-METALLIZING MnO-SIO/SUB 2-Al/SUB 2O/SUB 3 GLASSES
Michael C. Rey, Daniel P. Kramer, Linda D. Abney, and Gary L. Harville 10 Dec. 1982 8 p refs
(Contract DE-AC04-76DP-00053)
(DE83-004290; MLM-3031) Avail: NTIS HC A02/MF A01

Partial characterization of five glasses of the MnO-SiO2-Al2O3 system was made by measuring their thermal expansion coefficients, analyzing their differential thermal analysis spectra, determining their resistance to decomposition in H2/H2O gas mixtures. Powders of the glasses were previously mixed with molybdenum powder to make excellent metallizing agents for copper brazing 99.5% Al2O3 ceramics. DOE

N83-22433# Brookhaven National Lab., Upton, N. Y. Process Sciences Div.
PRODUCTS FORMED IN AGED Ca-POLYESTER COMPLEXED POLYMER CONCRETE CONTAINING CEMENT PASTE
T. Sugama and L. E. Kukacka Mar. 1982 21 p refs
(Contract DE-AC02-76CH-00016)
(DE83-004196; BNL-31172) Avail: NTIS HC A02/MF A01

Poorly crystallized calcium hydroxide [Ca(OH)2] yielded from portland cement pastes incorporated in calcium polyester complexed polymer concrete (Ca-UP PC) was slowly formed during 21 days' exposure in water at 240 C. Crystal growth continued as the hydration reactions proceeded. Ca(OH)2 formed within the amorphous organic polymer layers after up to 90 days' exposure had little if any effect on the ultimate strength of the PC composites. Ca(2) ions increased with exposure time, and they act as strongly nucleophilic agents to enhance the formation of complexed COO(+) (Ca(2)) groups. These contain an ionic bond between Ca(2+) ion and carboxylate anion (COO(+)) produced by the hydrolysis of esters in UP polymer. DOE

N83-22434# Sandia Labs., Albuquerque, N. Mex.
POLYURETHANE-FOAM-COMPONENT INCOMPATIBILITIES
K. B. Wischmann 1982 18 p refs
(Contract DE-AC04-76DP-00789)
(DE82-022162; SAND-82-1655; CONF-821038-1) Avail: NTIS HC A02/MF A01

Access deterrent foams are generated by mixing separately stored and pressurized isocyanate and polyol components upon demand. This specially designed rigid polyurethane foam system must survive ambient storage and still give acceptable foams. The polyol component, a polypropylene oxide diol adduct of phosphoric acid, in the presence of moisture apparently hydrolyzes to phosphoric acid which attacks the container and alters the foaming action. The phosphate ester adduct's fire-retardant characteristics were sacrificed in favor of a superior aging polyol component. Thus, a second foam formulation which did not contain any phosphoric acid adducts while exhibiting virtually identical foaming properties was aged under accelerated conditions. These conditions consisted of aging at room temperature, 60 and 71 C, whereby lifetime predictions could be made by Arrhenius modeling. DOE

N83-22435# Sandia Labs., Albuquerque, N. Mex.
PHYSICAL MOTIVATIONS OF THE CONSTITUTIVE RELATIONS FOR FERROELECTRIC CERAMICS AND THE EXISTENCE OF BUTTERFLY AND HYSTERESIS LOOPS
Peter J. Chen 1982 6 p refs Presented at the 9th US Natl. Congr. of Appl. Mech., Ithaca, N.Y., 21 Jun. 1982
(Contract DE-AC04-76DP-00789)
(DE82-017031; SAND-82-0469C; CONF-820614-4) Avail: NTIS HC A02/MF A01

The responses of ferroelectric ceramics can be quite complex depending on the physical processes to which they are subjected. Their mechanical, electromechanical and dielectric properties depend on domain switching, dipole dynamics and phase transformation which is caused by external stimuli such as mechanical and electrical loadings, and temperature variations. A theory, taking into account the effects of domain switching and dipole dynamics, was formulated, and in its present stage of development is sufficient to characterize various observable responses. Specifically, a special case of the theory predicts the nature of the butterfly and hysteresis loops. The butterfly and hysteresis loops are manifestations of the mechanical, electromechanical and dielectric responses due to domain switching produced by cyclic electric fields. Comparisons of the predictions of the theory with experimental results are made in a pseudo one dimensional context. DOE

N83-22436# Florida Univ., Gainesville.
SYNTHESIS AND CHARACTERIZATION OF NOVEL POLYMERS FROM NON-PETROLEUM SOURCES FOR USE IN ENHANCED OIL RECOVERY Progress Report, 1 Jul. 1981 - 30 Jun. 1982
G. B. Butler and T. E. Hogen-Esch 1982 32 p refs
(Contract DE-AS05-78ER-05947)
(DE82-008705; DOE/ER-05947/3) Avail: NTIS HC A03/MF A01

Synthesis and structural characterization of polysaccharide-based graft copolymers for use in tertiary oil recovery, determination of physical properties of the polymers and their solutions, and screening of the polymers to determine their utility in oil recovery were discussed. Synthesis and characterization have continued in the following five areas: starch-g-polyacrylamide (ST-g-PAM) copolymers; graft copolymers of other polysaccharides and acrylamides; a naturally occurring polysaccharide extracted from okra (Akro); graft copolymers of Schardinger-beta-dextrin and acrylamide (SD-g-PAM); chemical degradation of ST-g-PAM and SD-g-PAM copolymers. The following areas were investigated: characterization of copolymers by ultracentrifugation, size exclusion chromatography and nucleophore membrane filtration; rheological studies on copolymers; and statistical analysis of variables in graft copolymerization. DOE

N83-22437# DL Labs., New York, N.Y.
EVALUATION OF PROPERTIES OF INDUSTRIAL COATINGS Final Report
S. B. Levinson, S. Spindel, and J. H. Wilner Jul. 1982 141 p refs Sponsored by state of California
(PB83-118414; DL-3215; ARB-R-82/175) Avail: NTIS HC A07/MF A01 CSCL 11C

recently developed water-based, high-solids and powder industrial coatings to determine if these products have performance properties equivalent to the conventional high-solvent products which are used for the same purpose are given. A total of 105 (71 low-solvent and powder and 34 conventional) coatings from 30 suppliers were tested for a variety of properties which could affect in-use performance. In addition, manufacturing firms currently using low-solvent or powder coatings in production were surveyed to obtain information regarding the relative performance and economics of different types of coatings. Some of the new products tested had performance properties equivalent to or better than the conventional high solvent industrial coating product. GRA

N83-22438# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Plastics Div.
INDUSTRIAL BEHAVIOUR OF POLYMER ALLOYS: ANALYSIS AND NEW PERSPECTIVES
Henri Frederix, Roger Fayt, and Albert Gilliquet Oct. 1982 109 p Transl. into ENGLISH of the mono. "Comportement Industrial des Alliages Polymeriques: Analyse et Perspectives Nouvelles" France, Jul. 1981 98 p Original language document was announced as N82-21349
(PB83-115006) Avail: NTIS HC A06/MF A01 CSCL 11I

The effect of standard injection techniques on the mechanical properties of polymer alloys was investigated in order to improve the compatibility of constituent polymers. Laboratory tests (morphological, rheological) on PVC, PE and PS based mixes are reported. Polymer alloys respond to injection techniques in the same way as simple polymers. Alloys containing 50% PVC are too fluid to maintain set diameters. Pipe alloys containing 60% PVC of PS

rupture during tests. The most critical parameters when developing alloys are phase dispersion control and adhesion between phases. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N83-22439*# Science Applications, Inc., Chatsworth, Calif. Combustion Science and Advanced Technology Dept.
REVIEW OF ALTERNATIVE FUELS DATA BASES Final Report
P. T. Harsha and R. B. Edelman Jan. 1983 130 p refs Prepared for JPL
(NASA-CR-170203; NAS 1.26:170203; SAI-83-045-CHA) Avail: NTIS HC A07/MF A01 CSCL 21D

Based on an analysis of the interaction of fuel physical and chemical properties with combustion characteristics and indicators, a ranking of the importance of various fuel properties with respect to the combustion process was established. This ranking was used to define a suite of specific experiments whose objective is the development of an alternative fuels design data base. Combustion characteristics and indicators examined include droplet and spray formation, droplet vaporization and burning, ignition and flame stabilization, flame temperature, laminar flame speed, combustion completion, soot emissions, NOx and SOx emissions, and the fuels' thermal and oxidative stability and fouling and corrosion characteristics. Key fuel property data is found to include composition, thermochemical data, chemical kinetic rate information, and certain physical properties. S.L.

N83-22440# Institut de Recherche des Transports, Arcueil (France). Centre d'Evaluation et de Recherche des Nuisances et de l'Energie.
MOTOR-FUELS FOR ROAD VEHICLES
Jean Delsey, Jacques Lambert, and Alain Frybourg Nov. 1982 65 p refs In FRENCH; ENGLISH summary
(Rept-24) Avail: NTIS HC A04/MF A01

The different motor fuels used by road vehicles (super, gasoline, diesel oil, liquefied petrol gas,...) are defined. The different entries of energy consumption associated with the use and the manufacturing of the vehicle, as well as road construction and road maintenance are studied. The different existing methods of refining petrol are reviewed, followed by a study of the different techniques designed to adjust the qualities of motor fuels to the needs of the vehicles. The energy cost of motor fuel manufacturing is also mentioned. The different problems raised by substitution motor fuels are reviewed (alcohol, synthetical motor fuels,...). S.L.

N83-22441# Falcon Research and Development Co., Englewood, Colo
CORRELATION OF FLAMMABILITY TEST DATA OF ANTI-MISTING FUELS Final Report, Aug. 1980 - Aug. 1981
Levelle Mahood and Robert L. Talley Dec. 1982 47 p refs
(Contract DTFA03-80-C-00061)
(FAA-CT-82-29; Falcon-TR-364010) Avail: NTIS HC A03/MF A01

As a part of a comprehensive program to minimize post-crash fire hazards of jet transport aircraft, a correlation study was conducted on flammability test data of neat Jet A fuel, and the same fuel with various antimisting additives. The data were from full scale aircraft crash tests, large scale fuel spillage/ignition tests, and several small scale flammability tests. Various rheometric tests were also considered. The ability of certain antimisting fuels to eliminate large fireballs during occupant survivable aircraft crashes was amply supported. Large scale crash simulations were found to be highly developed, and provide essential credibility on a given antimisting fuel near the end of its development. Small scale flammability test rigs used for screening antimisting fuels were found generally effective, but with some conflicting data between rigs, and with some derivations from large scale results. Methods were defined which can provide higher confidence and resolution for selected test rigs. S.L.

N83-22442*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AVIATION GASOLINES AND FUTURE ALTERNATIVES
Donald J. Patterson, ed. Washington May 1983 164 p refs Workshop held in Cleveland, Ohio, 3-5 Feb. 1981
(NASA-CR-2267; E-1260; NAS 1.55:2267) Avail: NTIS HC A08/MF A01 CSCL 21D

General aviation industry needs and directions, fuel supply/demand issues, and general aviation technology prospects are discussed. For individual titles, see N83-22443 through N83-22457.

N83-22443*# Federal Aviation Administration, Washington, D.C. Aircraft Engineering Div.
FAA CERTIFICATION REQUIREMENTS FOR FUTURE FUELS, FUEL SYSTEMS AND POWERPLANTS
Thomas C. Horeff *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 7-9 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

The current FAA procedures for approving fuels, along with a comment or two as to what might be done relative to assuring the safety of using these alternative fuels, whatever they may be are addressed. Author

N83-22444*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AVIATION ENERGY AND THE FUTURE OF THE RECREATIONAL USE OF SPORT AND GENERAL AVIATION AIRCRAFT
Paul Poberezny (Experimental Aircraft Association) and Harry Zeisloft (Experimental Aircraft Association) *In its* Aviation Gasolines and Future Alternatives May 1983 p 9-14 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

The activities of the Experimental Aviation Association (EAA) are summarized. N.W.

N83-22445*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INDUSTRY'S ASSESSMENT OF THE NUMBER OF AIRPLANES IN THE GENERAL AVIATION FLEET ALONG WITH THEIR HOURS FLOWN AND FUEL CONSUMPTION DATA POWERED BY WHAT TYPE OF ENGINES, WHEN AND FOR WHAT REASONS, THROUGH THE YEAR 2000
Thomas J. Smith (Mooney Aircraft) *In its* Aviation Gasolines and Future Alternatives May 1983 p 15-32 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

The future of general aviation, its fuels, and the piston powered fleet of aircraft up to the year 2000, and beyond are considered. Author

N83-22446*# Michigan Univ., Ann Arbor.
LIGHTWEIGHT AIRCRAFT ENGINES, THE POTENTIAL AND PROBLEMS FOR USE OF AUTOMOTIVE FUELS
Donald J. Patterson *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 39-44 Original document was announced as N81-18057 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

A comprehensive data research and analysis for evaluating the use of automotive fuels as a substitute for aviation grade fuel by piston-type general aviation aircraft engines is presented. Historically known problems and potential problems with fuels were reviewed for possible impact relative to application to an aircraft

operational environment. This report reviews areas such as: fuel specification requirements, combustion knock, preignition, vapor lock, spark plug fouling, additives for fuel and oil, and storage stability. Author (GRA)

N83-22447*# Shell Oil Co., Houston, Tex.
GENERAL AVIATION FUEL QUALITY CONTROL
Herbert Poitz *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 45-50 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

Quality control measures for aviation gasoline, and some of the differences between quality control on avgas and mogas are discussed. One thing to keep in mind is that with motor gasoline you can always pull off to the side of the road. It's not so easy to do in an airplane. Consequently, there are reasons for having the tight specifications and the tight quality control measures on avgas as compared to motor gasoline. Author

N83-22448*# Phillips Petroleum Co., Bartlesville, Okla.
MANUFACTURING COMPARISONS OF AVIATION AND MOTOR GASOLINES
Lawrence O. Meyer *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 51-59 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

The manufacturing of avgas is compared with that of autogas. Author

N83-22449*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FUEL SUPPLY AND DISTRIBUTION. FIXED BASE OPERATION
Lawrence C. Burian (National Air Transportation Association) *In its* Aviation Gasolines and Future Alternatives May 1983 p 63-67 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

Aviation gasoline versus other products, a changing marketplace, the Airline Deregulation Act of 1978, aviation fuel credit card purchases, strategic locations, storage, co-mingling of fuel, and transportation to/from central storage are discussed. Author

N83-22450*# Teledyne Continental Motors, Mobile, Ala. Aircraft Products Div.
THE SPARK-IGNITION AIRCRAFT PISTON ENGINE OF THE FUTURE
Kenneth J. Stuckas *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 75-87 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01

The advanced technology, spark ignition, aircraft piston engine design study was conducted to determine the improvements that could be made by taking advantage of technology that could reasonably be expected to be made available for an engine intended for production by January 1, 1990. Two engines were proposed to account for levels of technology considered to be moderate risk and high risk. The moderate risk technology engine is a homogeneous charge engine operating on avgas and offers a 40% improvement in transportation efficiency over present designs. The high risk technology engine, with a stratified charge combustion system using kerosene-based jet fuel, projects a 65% improvement in transportation efficiency. Technology enablement program plans are proposed herein to set a timetable for the successful integration of each time of required advanced technology into the engine design. Author

N83-22451*# Cessna Aircraft Co., Wichita, Kans.
AIRFRAME AND ENGINE INTEGRATION AND POTENTIAL IMPROVEMENTS
David R. Ellis *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 89-97 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

Airframe design alternative to cope with degraded engine performance, such as lower power or increased fuel consumption resulting from changes in fuels, are addressed. Author

N83-22452*# Avco Lycoming Div., Williamsport, Pa.
CURRENT DESIGNS, FUTURE POSSIBILITIES AND PROGRAMMATIC SUGGESTIONS
Larry C. Duke *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 99-105 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

Current piston engines, future engines, and the approach to develop them are addressed. Technology requirements are mentioned. Author

N83-22453*# Garrett Turbine Engine Co., Phoenix, Ariz.
FUTURE OF ALTERNATE FUELS FOR TURBINE ENGINES
Helmut Schelp *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 107-121 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21D

The fuel property variations that were identified to be of concern with the utilization of alternate fuels for aircraft turbine engines are related to the potential problem areas. Author

N83-22454*# Curtiss-Wright Corp., Wood-Ridge, N.J.
ADVANCED ROTARY ENGINES **c07**
Charles Jones *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 123-137 Original document was announced as A80-38982 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

The broad objectives of this paper are the following: (1) to summarize the Curtiss-Wright design, development and field testing background in the area of rotary aircraft engines; (2) to briefly summarize past activity and update development work in the area of stratified charge rotary combustion engines; and (3) to discuss the development of a high-performance direct injected unthrottled stratified charge rotary combustion aircraft engine. Efficiency improvements through turbocharging are also discussed. Author

N83-22455*# Teledyne Continental Motors, Mobile, Ala. General Products Div.
LIGHTWEIGHT DIESEL AIRCRAFT ENGINES FOR GENERAL AVIATION **c07**
Steven G. Berenyi *In* NASA. Lewis Research Center Aviation Gasolines and Future Alternatives May 1983 p 136-147 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

Two different engines were studied. The advantages of a diesel to general aviation were reduced to fuel consumption, reduced operating costs, and reduced fire and explosion hazard. There were no ignition mixture control or inlet icing problems. There are fewer controls and no electrical interference problems. Author

N83-22456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN OVERVIEW OF GENERAL AVIATION PROPULSION RESEARCH PROGRAMS AT NASA LEWIS RESEARCH CENTER **c07**
Edward A. Willis *In its* Aviation Gasolines and Future Alternatives May 1983 p 149-160 Original document was announced as N81-16052 (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

The review covers near-term improvements for current-type piston engines, as well as studies and limited corroborative research on several advanced g/a engine concepts, including diesels, small turboprops and both piston and rotary stratified-charge engines. Also described is basic combustion research, cycle modeling and diagnostic instrumentation work that is required to make new engines a reality. T.M.

N83-22457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

GENERAL AVIATION TURBINE ENGINE (GATE) OVERVIEW
c07
William C. Strack *In its* Aviation Gasolines and Future Alternatives May 1983 p 161-166 ref (For primary document see N83-22442 12-28)
Avail: NTIS HC A08/MF A01 CSCL 21E

When all the technology studies were done and the accompanying market analyses were complete, the conclusion was that it is indeed possible to reduce the cost of turbine engines by a factor of 3 using low-cost manufacturing techniques and increased production rates. In the interest of reducing engine cost, some performance was sacrificed. Yet we ended up with about a 20 percent predicted improvement in SFC over current technology turboprops. However, even this level of improvement does not match the low SFC of reciprocating powerplants--particularly those advanced concepts described earlier. The 20 percent better SFC and much lower weight of a turboprop does mean that if such a powerplant were installed in a resized small airplane, one could save between 10 and 30 percent fuel relative to existing recip engines, depending on different mission and airplane combinations. The price of the aircraft would go down about 15 percent in the case of a high powered single, or 25 percent in the case of a normal size twin. The operating costs would decrease about 10 percent in the case of the single, and as much as 35 percent in the case of the twin. Author

N83-22458# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STUDY OF INSTABILITY IN SOLID PROPELLANTS M. S. Thesis [ESTUDO DE INSTABILIDADE EM PROPELENTES SOLIDOS]
Carlos Eduardo Rolfsen Salles Feb. 1983 93 p refs In PORTUGUESE; ENGLISH summary
(INPE-2641-TDL/115) Avail: NTIS HC A05/MF A01

Solid propellant combustion instability problems were examined. Pressure versus time recording from T-Burner tests yield the growth and decay constants while the mean flow parameters are estimated through the minimization of the Gibbs function. Hence the real part of the Acoustic Admittance is obtained and propellants can be compared. Author

N83-22459# University of Southern Illinois, Carbondale. Fisheries Research Lab.
USE OF CORN-DISTILLERS SOLUBLES FROM AN ETHANOL PLANT FOR AQUACULTURE Semiannual Technical Progress Report
Christopher C. Kohler, William M. Lewis, and Steven P. Krueger 12 Mar. 1982 11 p
(Contract DE-FG02-81R5-10295)
(DE82-009801; DOE/R5-10295/1) Avail: NTIS HC A02/MF A01

The potential exists for using corn distiller's solubles for the controlled production of aquatic organisms (aquaculture). Results of initial laboratory studies which have focused on assessing the short term effects of various concentrations of corn distiller's solubles on water quality and aquatic organisms (fish, macrocrustaceans, microcrustaceans, and algae) are described. The results, coupled with results of studies currently in progress, will be used to identify a suitable quantity of corn distiller's solubles for daily application to the earthen ponds that will be used in the field production trials. DOE

N83-22460# Solar Turbines International, San Diego, Calif.
DEVELOPMENT OF LIGHTWEIGHT HYDRIDES
J. F. Nachman, David A. Rohy, and T. A. Argabright Jul. 1982 118 p refs
(Contract DE-AC03-78CS-52059)
(DE83-004227; DOE/CS-52059/1) Avail: NTIS HC A06/MF A01

The development of the metal hydride approach for hydrogen storage is discussed. Metal hydrides stores more hydrogen per unit volume than normal high pressure or even cryogenic hydrogen techniques. Little energy is required to store the hydrogen in the hydride, and high stability at room temperature ensures low losses over long storage periods. Safety features of metal hydride storage are favorable. Because of its low weight and high hydrogen storage densities, modified magnesium alloy based hydrides appear to offer the greatest potential for automotive storage of hydrogen. The optimization of this storage system was studied. Due to the relative stability of MgH2 modifications of the form MgMHx (M = metal atom) decreased the dissociation temperature while retaining high hydrogen capacity. This parameter is crucial since vehicle exhaust will supply the thermal energy to dissociate the hydride in an automobile. It is indicated that hydride dissociation temperature should be 2000 C or lower to ensure uninterrupted fuel flow at all driving and idle conditions. Modifications to magnesium hydride based families of materials are described. DOE

N83-22461# E-F Technology, Inc., St. Johns, Mich.
THE ALTERNATIVE FUELS FOR MEDIUM SPEED DIESEL ENGINES (AFFMSDE) PROJECT: A BASELINE PROGRAM PLANNING CONCEPT FOR REVIEW AND REVISION Final Report
Jun. 1982 43 p refs
(Contract DE-AC02-81CS-50048)
(DE83-002565; DOE/CS-50048/T1) Avail: NTIS HC A03/MF A01

Suggestions and recommendations for the long term continuation of the Alternative Fuels for Medium Speed Diesel Engines (AFFMSDE) Program as program support transitions from government to industry were suggested. Identification of the means of conserving railway used petroleum resources through the use of petroleum based fuels with properties deviating significantly from conventional specification diesel fuels and/or through the use of fossil fuels not derived from petroleum was examined. The Multi-Year approach to Program Management Planning presented here is a suggested baseline concept. If it is subjected to review, revision, and expansion in detail by all program participants, it might provide some assistance in developing long-term, planned, support, and continuity of management that programs of this type require. B.G.

N83-22462# Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
ALTERNATIVE ENGINE FUELS: EDUCATIONAL DEMONSTRATION PROJECT Final Report
John A. True 15 Dec. 1982 9 p
(Contract DE-FG02-81R5-10316)
(DE83-004579; DOE/R5-10316-T1) Avail: NTIS HC A02/MF A01

The purpose was to produce four educational tools: two portable engine demonstration trailers that show the operational characteristics of a spark ignition engine and a diesel engine burning various alternative fuels; a 16 mm movie of the several engine fuel demonstrations for use in physical situations where the actual demonstrations cannot be given; Agricultural Extension Service bulletins describing the operation of engines on alternative fuels; and construction plans and procedures for use by others in assembling similar demonstrations. The 2 trailers, one with a spark-ignition engine-generator set, one with a diesel engine-generator set, were built and demonstrated at 9 farm meetings with about 1500 people attending. A single 12-minute 16 mm film on the use of ethanol and sunflower oil as alternate fuels was produced and is available for public use. A paper titled Alternative Engine Fuels Demonstration and Materials Test was presented at a meeting of Agricultural Engineers and is available. DOE

N83-22463# SRI International Corp., Menlo Park, Calif. Physical Sciences Div.
CHARACTERIZATION OF INITIATION AND DETONATION BY LAGRANGE GAGE TECHNIQUES Final Report
M. Cowperthwaite Jan. 1982 36 p refs
(Contract W-7405-eng-48; SRI Proj. PYU-1790)
(DE83-001129; UCRL-15482) Avail: NTIS HC A03/MF A01

A reactive flow Lagrange analysis (RFLA) for shocked explosives is discussed. This RFLA takes a set of Lagrange particle velocity and pressure histories recorded in shocked explosive as input and calculates the flow fields in the explosive and its global rate of decomposition. A similarity solution modeling a type of

initiation observed in PBX9404 and incorporating a realistic description of shocked explosive was constructed to provide a means of testing the computational procedures used in the RFLA. These procedures and the RFLA were validated in test calculations performed with the similarity solution. DOE

N83-22464# Texas A&M Univ., College Station. Agricultural Experiment Station.
ECONOMIC AND ENGINEERING EVALUATION OF PLANT OILS AS A DIESEL FUEL Final Report
C. R. Engler, W. A. LePori, L. A. Johnson, R. C. Griffin, K. C. Diehl, D. S. Moore, R. D. Lacewell, C. G. Coble, E. W. Lusas, and E. A. Hiler 15 Apr. 1982 160 p refs Sponsored in part by the Center for Energy and Mineral Resources, and the Food Protein Research and Development Center
(TENRAC Proj. 80-B-4-4A)
(DE83-900805; TENRAC/EDF-065) Avail: NTIS HC A08/MF A01

The annual total yield of plant oils in the US is about 3.7 billion gallons. Diesel use by agriculture is about 2.0 billion gallons annually and is growing rapidly relative to gasoline use. Based on these amounts, plant oils could satisfy agriculture's diesel fuel requirements during the near future. However, diversion of large quantities of plant oils for such purposes would have dramatic impacts on plant oil prices and be reflected in numerous adjustments throughout agriculture and other sectors of the economy. The competitive position of sunflowers for plant oil production in Texas was analyzed. In those regions with a cotton alternative, sunflowers were not, for the most part, economically competitive. However, sunflowers production is competitive with grain sorghum in certain cases. To develop a meaningful production base for oilseed crops in Texas, yields need to be improved or increases in oilseed prices relative to cotton must take place. This implies some limitations for the potential of Texas to produce large quantities of plant oils. DOE

N83-22465# Parsons (Ralph M.) Co., Pasadena, Calif.
DELIVERABLE 14B. PROCESS ENGINEERING AND MECHANICAL DESIGN REPORTS. VOLUME 3: PRELIMINARY DESIGN AND ASSESSMENT OF A 12,500 BPD COAL-TO-METHANOL-TO-GASOLINE PLANT
Aug. 1982 221 p Prepared in cooperation with W. R. Grace and Co. 4 Vol.
(Contract DE-FC02-80ET-14759)
(DE83-000843; DOE/ET-14759/T1-Vol-3-14B) Avail: NTIS HC A10/MF A01

Various unit processes are considered. A brief description, basis of design; process selection rationale, a brief description of the process chosen and a risk assessment evaluation (for some cases) are included. DOE

N83-22466# California Univ., Livermore. Lawrence Livermore Lab.
THE HFEM MONITORING OF COAL GASIFICATION: RAWLINS, WYOMING
E. F. Laine, N. J. Chakakis, W. D. Daily, F. J. Deadrick, G. Holladay, and K. I. Kishiyama 24 Mar. 1982 21 p refs
(Contract W-7405-eng-48)
(DE82-013801; UCID-19363) Avail: NTIS HC A02/MF A01

This report covers the high frequency electromagnetic monitoring (HFEM) of an underground coal gasification test located in the North Knobs area about eight miles west of Rawlins, Wyoming in Section II T21N, R89W. At the test site, the gasified coal seam is steeply dipping (63 deg) with a seam width of about 23 feet. The coal is subbituminous. The purpose of the HFEM is to monitor the burn or cavity progress between the injection well and the production well. Unfortunately, all the boreholes did not extend far enough through the coal seam to allow viewing of the bottom portion of the coal seam. Two key boreholes failed prior to initiation of the burn and became unusable. The results of monitoring with the available boreholes are given. DOE

N83-22467# Aerospace Corp., El Segundo, Calif. Energy Conservation Directorate.
ASSESSMENT OF METHANE-RELATED FUELS FOR AUTOMOTIVE FLEET VEHICLES. VOLUME 2: TECHNICAL, SUPPLY AND ECONOMIC ASSESSMENTS
Feb. 1982 244 p refs 3 Vol.
(Contract DE-AC01-80CS-50179)
(DE82-013287; DOE/CE-50179/1-Vol-2) Avail: NTIS HC A11/MF A01

The use of methane related fuels, derived from a variety of sources, in highway vehicles is assessed. Methane, as used here, includes natural gas (NG) as well as synthetic natural gas (SNG). Methanol is included because it can be produced from NG or the same resources as SNG, and because it is a liquid fuel at normal ambient conditions. Technological, operational, efficiency, petroleum displacement, supply, safety, and economic issues are analyzed. In principle, both NG and methanol allow more efficient engine operation than gasoline. In practice, engines are at present rarely optimized for NG and methanol. On the basis of energy expended from resource extraction to end use, only optimized LNG vehicles of total petroleum based highway vehicle fuel could be displaced by large fleets with central NG fueling depots. DOE

N83-22468# Aerospace Corp., El Segundo, Calif.
ASSESSMENT FOR METHANE-RELATED FUELS FOR AUTOMOTIVE FLEET VEHICLES. VOLUME 3: APPENDICES
Feb. 1982 252 p refs 3 Vol.
(Contract DE-AC01-80CS-50179)
(DE82-013190; DOE/CE-50179/1-Vol-3) Avail: NTIS HC A12/MF A01

Fuel composition and properties; operating characteristics of compressed natural gas, liquid natural gas, and methanol vehicles; production technology for natural gas, synthetic natural gas, and methanol; and review comments from outside sources such as automobile manufacturers, US agencies, and research laboratories relative to issues related to the use of methanol fuels and natural gas in US automobiles. DOE

N83-22469# Singmaster and Breyer, New York.
TECHNICAL/COMMERCIAL FEASIBILITY STUDY OF THE PRODUCTION OF FUEL-GRADE ETHANOL FROM CORN: 100-MILLION GALLON-PER-YEAR PRODUCTION FACILITY IN MYRTLE GROVE, LOUISIANA
31 May 1982 89 p Prepared in cooperation with Chemapec, Inc., Woodbury, N.Y.
(Contract DE-FG07-81DI-2274)
(DE83-000789; DOE/ID-12274/T1-Vol-7) Avail: NTIS HC A05/MF A01

Engineering drawings for an ethanol from corn production plant are given. Plans for fire protection yards and plot plans are given. Plans for general plant arrangements, equipment layouts, and power distribution centers are given. Electrical diagrams are included. DOE

N83-22470# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MARINE BIOMASS: NEW YORK STATE SITE AND SPECIES STUDY COMPOSITIONAL ANALYSIS AND SYSTEMS STUDIES Final Report, Mar. - Dec. 1981
Ralph W. Makinen, K. M. Farley, and W. R. Kugler Feb. 1982 119 p refs Sponsored by Gas Research Inst.
(PB83-126078; GRI-81/0096) Avail: NTIS HC A06/MF A01 CSCL 21D

The primary objective of the marine biomass programs is to provide an optimized, integrated process for producing methane from seaweeds cultivated in the open ocean and to do so at a price which is competitive with that of methane from other sources. The New York State Site and Species Study represents the first evaluation of a site outside of Southern California. It was concluded that two species would be required to assure year round operation. Since the different species being considered have different chemical compositions, this could create significant digestion problems during the changeover period. GRA

N83-23214# Council for Scientific and Industrial Research, Pretoria (South Africa).
ALTERNATIVE MOTOR FUELS
Ernst A. Uken (FEDHASA) *In its* Ann. Transportation Conv., Vol. 2 1982 27 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N83-22471# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 15, NO. 1 Monthly Report
Judith Nagle-Eshleman, ed. Jan. 1983 105 p refs
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 AD-A123747 CSCL 20/11

Textbooks and periodical literature in acoustics, substructure analysis of vibrating systems, and empirical modal analysis are discussed. For individual titles, see N83-22472 through N83-22474.

N83-22472# Miller (V. R.), Huber Heights, Ohio.
TEXTBOOKS AND PERIODICAL LITERATURE IN ACOUSTICS **c71**
V. R. Miller *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, no. 2 Jan. 1983 p 5-16 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/1

Available textbooks on acoustics are reviewed. The books are arranged to show the wealth of information that exists and the various aspects of acoustics, from theoretical considerations to practical and experimental applications. Periodical literature is also included. Author

N83-22473# Tufts Univ., Medford, Mass. Dept. of Mechanical Engineering.
SUBSTRUCTURE ANALYSIS OF VIBRATING SYSTEMS **c39**
R. Greif and L. Wu *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol 15, no. 2 Jan. 1983 p 17-24 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Substructure analysis of vibrating systems is summarized. Among the topics are component mode synthesis including truncation procedures, transfer matrix methods, and condensation techniques. The discussion includes applications to a variety of engineering problems as well as nonlinear and nonconservative systems. Author

N83-22474# Michigan State Univ., East Lansing. Dept. of Mechanical Engineering.
EMPIRICAL MODAL ANALYSIS **c39**
M. N. Rizai, J. E. Bernard, and J. M. Starkey (Purdue Univ., Lafayette, Ind.) *In* Shock and Vibration Information Center The Shock and Vibration Digest, v. 15, no. 2 Jan. 1983 p 25-30 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Test apparatus that digitize analog signals and use fast Fourier transforms and related analytical tools to determine natural frequencies and mode shapes are now routinely available to test engineers. The equipment and associated test techniques, called modal testing, are now an important aspect of structural analysis in the initial design process, in design verification, and in trouble-shooting. A short history of modal testing and a review of developments over the last seven years, including multiple-point excitation and design modification based on modal test results. The paper concludes with a brief review of the closely related topic of acoustic intensity. Author

N83-22475# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 15, NO. 2 Monthly Report
Judith Nagle-Eshleman, ed. Feb. 1983 81 p refs
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 AD-A125390 CSCL 20/11

Various considerations are raised by the concept stress screening. Information exchange plays an important role in developing stress screening test requirements. Three concepts dealt with are helicopter vibration, fiber reinforced composites, and ship hull vibration. For individual titles, see N83-22476 through N83-22478.

N83-22476# Idaho Univ., Moscow. Dept. of Mechanical Engineering.
RECENT RESEARCH ON DYNAMIC MECHANICAL PROPERTIES OF FIBER REINFORCED COMPOSITE MATERIALS AND STRUCTURES **c24**
R. F. Gibson *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 3-16 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 11/4

Recent analytical and experimental efforts to characterize the internal damping and dynamic stiffness of fiber reinforced composite materials and structures under vibratory loading were reviewed. The implications of these findings and directions of continued research are discussed. Author

N83-22477# City Univ., London (England). Dept. of Mechanical Engineering.
FURTHER ADVANCES IN HELICOPTER VIBRATION CONTROL **c05**
G. T. S. Done *In* Shock and Vibration Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 17-22 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

Advances that were made since 1979 in the control of helicopter vibration and the associated literature were reviewed. Vibration isolation, absorbers, direct rotor control, structural design and modification, and vibration studies are considered. Author

N83-22478# Technical Univ. of Denmark, Lyngby. Dept. of Ocean Engineering.
BEAM MODELS FOR SHIP HULL VIBRATION ANALYSIS **c39**
J. J. Jensen *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 23-27 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Beam models used for hull vibration analysis are reviewed. The main conclusion drawn is that the Timoshenko beam theory, with a proper definition of the shear coefficient, can accurately predict the lowest vertical hull vibration modes and corresponding natural frequencies. For coupled horizontal torsional vibrations a realistic modeling of major discontinuities in the hull beam is necessary in order to achieve reliable results. Author

N83-22479# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Zwijnaarde (Belgium).
ELEMENTS IN THE DESIGN OF STEEL STRUCTURES IN A SEISMIC ZONE [ELEMENTS DE CONCEPTION DES STRUCTURES EN ACIER EN ZONE SISMIQUE]
Andre Plumier Sep. 1981 56 p refs In FRENCH
(NT-20) Copyright. Avail: Issuing Activity

Steel presents intrinsic qualities which make it a more adaptable material than others for construction in seismic zones. Its rational use requires respect for a certain number of principles related as

much to the form of the aggregate structure and to the distribution of resistant elements as to the constitution of couplings or the choice of profiles and nuances of the steel. These principles are developed by locating the problem in a general context and treating seismic actions and the methods of computation.Transl. by A.R.H.

N83-22480# National Technical Information Service, Springfield, Va.
FEDERAL TECHNOLOGY CATALOG 1982: SUMMARIES OF PRACTICAL TECHNOLOGY Tech Notes Annual Index
1982 331 p
(PB83-121533) Avail: NTIS HC $19.50

The catalog presents summaries of practical technology selected for commercial potential and/or promising applications to the fields of computer technology, electrotechnology, energy, engineering, life sciences, machinery and tools, manufacturing, materials, physical sciences, and testing and instrumentation. Each summary not only describes a technology, but gives a source for further information. This publication describes some 1,100 new processes, inventions, equipment, software, and techniques developed by and for dozens of Federal agencies during 1982. Included is coverage of NASA Tech Briefs, DOE Energygrams, and Army Manufacturing Notes. M.G.

N83-22481# Air Force Engineering and Services Center, Tyndall AFB, Fla. Engineering and Services Lab.
TEST RESULTS: HALON 1301 VERSUS WATER SPRINKLER FIRE PROTECTION FOR ESSENTIAL ELECTRONIC EQUIPMENT Final Report, Nov. 1980 - Jun. 1982
Eric F. Reichelt, Joseph L. Walker, Richard N. Vickers, and Anthony J. Kwan Jul. 1982 186 p refs
(AF Proj. 2505)
(AD-A122602; AFESC/ESL-TR-82-28) Avail: NTIS HC A09/MF A01 CSCL 11/9

This report describes results of testing two contending extinguishants, Halon 1301 and water, for fire protection of essential electronic equipment. A series of controlled fires in a facility housing an operational electronic data processing system sought to establish immediate and long term effects of exposure of sensitive electronic equipment and stored data to fire extinguishment atmospheres. Test results lead to the conclusion that Halon 1301 is superior to water as an extinguishant for fires occurring in essential electronic equipment installations. Author (GRA)

N83-22482# National Center for Resource Recovery, Washington, D. C.
PROTOTYPE TRAMP-METAL SEPARATOR: A SUMMARY OF TEST RESULTS Interim Report
Richard Bolczak Nov. 1982 44 p
(Contract DE-AC01-80CS-24317)
(DE83-003840; DOE/CS-24317/2) Avail: NTIS HC A03/MF A01

The test program on the prototype tramp metal separator (PTMS) consists of three stages. Typical municipal solid waste feedstocks that had undergone size reduction and trommeling were analyzed to determine their physical characteristics and to obtain samples of tramp metal. Tests were performed on individual particles to determine relevant aerodynamic properties. The PTMS was used to measure the deflections of selected particles and feedstocks dropped through the horizontal airstream. DOE

N83-22483# Mound Lab., Miamisburg, Ohio.
TOLERANCE LAYOUTS - THEIR PHILOSOPHY, CONSTRUCTION AND USE
Albert V. Gress, Jr. 14 Oct. 1982 19 p
(Contract DE-AC04-76DP-00053)
(DE83-001696; MLM-2986) Avail: NTIS HC A02/MF A01

Tolerance stackups and layouts are one of the techniques used by process engineering in a preproduction design review. These assembly layouts indicate whether pieceparts fit properly and/or whether the assembly will perform as desired. Scaled layouts showing the two worst-case tolerance conditions (maximum and minimum clearance) are prepared for analysis. This technique is a powerful tool used for dimensional analysis and cost avoidance. DOE

N83-22484# Massachusetts Inst. of Tech., Cambridge.
COMPUTER-AIDED INDUSTRIAL PROCESS DESIGN. THE ASPEN PROJECT Final Report, 1 Jun. 1976 - 30 Nov. 1981
1 Feb. 1982 39 p refs
(Contracts DE-AT01-76ET-10696; E(49-18)-2295)
(DE82-014469; MIT-2295T9-18) Avail: NTIS HC A03/MF A01

The ASPEN Project was carried out at the Massachusetts Institute of Technology from 1976-1981. This report formally documents the work completed under the main contract between MIT and the US Department of Energy (Contract No. E(49-18)-2295 Task No. 9). In addition to the main contract, there were related contracts between MIT and the US Department of Energy on which work was reported separately. The project deliverables consisted of the source code and test problems for the ASPEN system on computer tape and a final report. The User Manual (1348 pages), the System Administrator Manual (1170 pages), and the Technical Reference Manual (1026 pages), and On-Line Documentation (Computer-Generated Tables) on magnetic tape were deliverables on a related, but separate contract. The source code versions of the system itself were provided, with installation instructions, for four different computers and operating system (IBM/OS, IBM/CMS, DEC/VAX, and Univac. DOE

N83-22485# Bendix Corp., Kansas City, Mo.
SPIN FORMING DEVELOPMENT
W. G. Gates May 1982 28 p refs
(Contract DE-AC04-76DP-00613)
(DE82-016993; BDX-613-2709) Avail: NTIS HC A03/MF A01

Bendix product applications require the capability of fabricating heavy gage, high strength materials. Five commercial sources have been identified that have the capability of spin forming metal thicknesses greater than 9.5 mm and four equipment manufacturers produce machines with this capability. Twelve assemblies selected as candidates for spin forming applications require spin forming of titanium, 250 maraging steel, 17-4 pH stainless steel, Nitronic 40 steel, 304 L stainless steel, and 6061 aluminum. Twelve parts have been cold spin formed from a 250 maraging steel 8.1 mm wall thickness machine preform, and six have been hot spin formed directly from 31.8-mm-thick flat plate. Thirty-three Ti-6Al-4V titanium alloy parts and 26 17-4 pH stainless steel parts have been hot spin formed directly from 31.8-mm-thick plate. Hot spin forming directly from plate has demonstrated the feasibility and favorable economics of this fabrication technique for Bendix applications. DOE

N83-22486# Institution of Engineers, Calcutta (India).
SEMINAR ON USE OF HIGH STRENGTH DEFORMED BARS
Apr. 1981 90 p refs Proceedings of Seminar held at Nagpur, India, 11-12 Apr. 1981
(PB83-122580) Avail: NTIS HC A05/MF A01 CSCL 13C

Steel requirements, cost and energy for two lane curved and straight bridges for 20 m span are studied. Saving in steel cost and energy by using high strength bars is also discussed. Only 20 m span, straight simply supported and 5 deg, 10 deg and 15 deg curved simply supported bridges are considered. The width of bridge is taken as 7.8 m. Bridges are designed with steel stresses 1900 kgs/cm sq, 2100 kgs/sq cm and 2500 kgs/sq cm and saving in steel, cost and energy is given. GRA

N83-22487# Texas State Dept. of Highways and Public Transportation, Austin.
POLYMER CONCRETE OVERLAYS Final Report, Jun. 1980 - Jan. 1982
Ralph K. Banks, Donald L. OConnor, H. D. Butler, David Hustace, and Franklin S. Craig Jan. 1982 56 p refs
(Contract DOT-FH-11-8608)
(PB83-124594) Avail: NTIS HC A04/MF A01 CSCL 13C

The status and performance to date of an experimental bridge deck overlay of polymer concrete consisting of 4 courses of polyester styrene resin and sand aggregate are given. The primary

purpose of such an overlay is to bar against moisture penetrating into the top surface of the concrete and perpetuating corrosion of the reinforcing steel, and also to keep away further chloride contamination. GRA

N83-22488# Maryland Univ., College Park.
EXPERT COMPUTER SYSTEMS AND THEIR APPLICABILITY TO AUTOMATED MANUFACTURING
Dana S. Nau Feb. 1982 107 p refs
(PB83-126623; NBSIR-81-2466) Avail: NTIS HC A06/MF A01 CSCL 13H

A tutorial on techniques used in expert systems and some recommendations for an automated process planning system for the Automated Manufacturing Research Facility at the National Bureau of Standards (NBS) are presented. The tutorial portion of the paper discusses problem solving and knowledge representation techniques. Also discussed are ways in which these techniques have been used to build computer systems which achieve a high level of performance on problems which normally require significant human expertise for their solution. A summary of the activities required for process planning in the Automated Manufacturing Research Facility at NBS are presented, and recommendations for how to accomplish these along with recommendations for how to accomplish these activities. Recommendations for how an expert system could be designed to perform a process planning activity called process selection are also given. GRA

N83-22489# National Bureau of Standards, Washington, D.C.
THERMAL COMFORT IN PASSIVE SOLAR BUILDINGS: AN ANNOTATED BIBLIOGRAPHY
Arthur I. Rubin Oct. 1982 83 p
(Contract DE-AI01-76PR-06010)
(PB83-133595; NBSIR-82-2585) Avail: NTIS HC A05/MF A01 CSCL 13M

A selective annotated bibliography of thermal research organized around major subject areas, and recommendations for research concerned with thermal comfort in passive solar buildings is studied. The state of the art of thermal comfort research and findings are described and the research needed to develop the information required by those responsible for specifying, designing and operating passive solar buildings is indicated. GRA

N83-22251# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF TOOLS FOR WORK IN SPACE
A. Pokrovskiy *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 88-91 Transl. into ENGLISH from Pravda (Moscow), 19 Sep. 1982 p 6 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22259*# Stanford Univ., Calif.
ACTIVE STABILIZATION OF A FLEXIBLE ANTENNA FEED TOWER
Arthur E. Bryson, Jr. *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 39-58 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N83-22490# Kraftfahrt-Bundesmat, Flensburg (West Germany).
HUMANIZATION OF WORK CIRCUMSTANCES IN DIALOG COMMUNICATION USING DATA DISPLAY DEVICES, VOLUME 1 Final Report, Sep. 1980
Helga Graunke, Horst Julich, Hans-Carl Petersen, Horst Schaefer, and Klaus Strupp Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 328 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-HA-82-037-Vol-1; ISSN-0171-7618) Avail: NTIS HC A15/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 68,50

The effects of data display on working places was investigated. Data processing by data display devices is not considered. Important criteria for job contentment is the integration into complex job structures. Corresponding to this principle of organization is team work with a flexible way of labor division which provides the chance and the motivation for a cooperative self controlled working process which give strain caused by data display devices. It is found that in public administration a team with an institutional leadership with primarily social integrative functions is appreciated most. E.A.K.

N83-22491# Kraftfahrt-Bundesmat, Flensburg (West Germany).
HUMANIZATION OF WORK CIRCUMSTANCES IN DIALOG COMMUNICATION USING DATA DISPLAY DEVICES, VOLUME 2 Final Report, Sep. 1980
Helga Graunke, Horst Julich, Hans-Carl Petersen, Horst Schaefer, and Klaus Strupp Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 191 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.
(BMFT-FB-HA-82-037-Vol-2; ISSN-0171-7618) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 68,50

Human factors engineering in working conditions on data display devices communication in the automotive industry was studied. Work environments designs and areas with data display devices are outlined. The Psychosocial organization development project for humanizing the data recording routine in the automotive industry is examined. E.A.K.

N83-22492# MATRA Espace, Paris-Velizy (France).
INVESTIGATION OF ATMOSPHERIC TRANSMISSION [ETUDE DE LA TRANSMISSION ATMOSPHERIQUE]
16 Nov. 1982 68 p refs In FRENCH
(DEL-GT-1293) Avail: NTIS HC A04/MF A01

Physical phenomena involved in computing atmospheric transmission are examined with emphasis on molecular absorption and the effects of atmospheric dispersion. Mathematical models of these phenomena developed using the 4052 computer are proposed. Results of the simulation are given for certain representative cases of existing climates. Conditions for the real time operation of telemetry equipment are considered. Transl. by A.R.H.

N83-22493*# City Coll. of the City Univ. of New York. Communications Systems Lab.
COMPUTER SIMULATOR FOR A MOBILE TELEPHONE SYSTEM Progress Report, 21 Apr. 1982 - 25 Jan. 1983
Donald L. Schilling and Chaim Ziegler 12 Apr. 1983 97 p refs (Grant NAG3-277)
(NASA-CR-170181; NAS 1.26:170181) Avail: NTIS HC A05/MF A01 CSCL 17B

A software simulator was developed to help in the design of the LMSS. The simulator is used to study the characteristics and implementation requirements of the LMSS' configuration. S.L.

N83-22494*# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
ENGINEERING CALCULATIONS FOR COMMUNICATIONS SYSTEMS PLANNING Summary Report, 20 Jan. 1981 - 15 Jul. 1982
C. A. Levis, C. H. Martin, C. W. Wang, and D. Gonsalvez Mar. 1982 70 p refs
(Grant NAG3-159)
(NASA-CR-170182; NAS 1.26:170182; ESL-713533-2; SR-1) Avail: NTIS HC A04/MF A01 CSCL 17B

The single entry interference problem is treated for frequency sharing between the broadcasting satellite and intersatellite

services near 23 GHz. It is recommended that very long (more than 120 longitude difference) intersatellite hops be relegated to the unshared portion of the band. When this is done, it is found that suitable orbit assignments can be determined easily with the aid of a set of universal curves. An attempt to develop synthesis procedures for optimally assigning frequencies and orbital slots for the broadcasting satellite service in region 2 was initiated. Several discrete programming and continuous optimization techniques are discussed. S.L.

N83-22495*# Harris Corp., Melbourne, Fla. Government Electronic Systems Div.

PHASED ARRAY-FED ANTENNA CONFIGURATION STUDY: TECHNOLOGY ASSESSMENT

W. F. Croswell, D. E. Ball, and R. C. Taylor Apr. 1983 141 p refs

(Contract NAS3-23252)

(NASA-CR-168078; NAS 1.26:168078) Avail: NTIS HC A07/MF A01 CSCL 20N

Spacecraft array fed reflector antenna systems were assessed for particular application to a multiple fixed spot beam/multiple scanning spot beam system. Reflector optics systems are reviewed in addition to an investigation of the feasibility of the use of monolithic microwave integrated circuit power amplifiers and phase shifters in each element of the array feed. S.L.

N83-22496# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PROGRAM FOR ANALYSIS AND OPTIMIZATION OF CASCADED QUADRUPOLES IN MICROWAVE [ANALISE/CIRCUITOS: UM PROGRAMA PARA ANALISE E OTIMIZACAO DE QUADRIPOLOS EM CASCATA EM MICROONDAS]

Claudemir Marcos daSilva Feb. 1983 22 p In PORTUGUESE; ENGLISH summary Presented at the 1st Reg. Appl. and Computational Math. Meeting, Sao Jose dos Campos, Brazil, 23-25 Feb. 1983

(INPE-2653-PRE/266) Avail: NTIS HC A02/MF A01

A computer program for design, analysis and optimization of cascaded quadrupoles in microwaves is described. The circuit analysis is made from its ABCD matrix obtained by the multiplication of the ABCD matrices of each internally defined element. The results of the analysis include the SWR of both ports, the transductive gain, the noise figure, and the phase delay. As an aid in circuit design the program can supply the constant noise figure and gain circles, stability regions obtained from S parameters, circles of constant transductive gain having the generator or load impedance reflection coefficient as parameter, the impedance of both ports and other figures of interest for the analysis of linear circuits. There are two methods for optimization: conjugated gradient and direct search. S.L.

N83-22497*# Virginia Univ., Charlottesville. Dept. of Electrical Engineering.

TRELLIS PHASE CODES FOR POWER-BANDWITH EFFICIENT SATELLITE COMMUNICATIONS Final Report, 10 Apr. 1979 - 22 Feb. 1981

S. G. Wilson, J. H. Highfill, C-D. Hsu, and R. Harkness Apr. 1981 79 p refs

(Contract NAS5-25634)

(NASA-CR-170163; NAS 1.26:170163; UVA/525634-EE81/101) Avail: NTIS HC A05/MF A01 CSCL 17B

Support work on improved power and spectrum utilization on digital satellite channels was performed. Specific attention is given to the class of signalling schemes known as continuous phase modulation (CPM). The specific work described in this report addresses: analytical bounds on error probability for multi-h phase codes, power and bandwidth characterization of 4-ary multi-h codes, and initial results of channel simulation to assess the impact of band limiting filters and nonlinear amplifiers on CPM performance. B.C.

N83-22498# California Univ., Livermore. Lawrence Livermore Lab.

ELECTROMAGNETIC TEST-FACILITY CHARACTERIZATION: AN IDENTIFICATION APPROACH

J. E. Zicker and J. V. Candy Dec. 1982 92 p refs

(Contract W-7405-eng-48)

(DE83-004274; UCID-19620) Avail: NTIS HC A05/MF A01

The response of an object subjected to high energy, transient electromagnetic (EM) fields sometimes called electromagnetic pulses (EMP), is an important issue in the survivability of electronic systems (e.g., aircraft), especially when the field is generated by a high altitude nuclear burst. The characterization of transient response information is a matter of national concern. Techniques to: (1) improve signal processing at a test facility; and (2) parameterize a particular object response are discussed. The application of identification based signal processing techniques to improve signal levels is considered. Models of test equipment are identified and used to deconvolve the input/output sequences for the object under test. A parametric model of the object is identified from this data. The model can be used to extrapolate the response to these threat level EMP. Also discussed is the development of a facility simulator (EMSIM) useful for experimental design and calibration and a deconvolution algorithm (DECONV) useful for removing probe effects from the measured data. DOE

N83-22499# Illinois Univ., Urbana. Dept. of Electrical Engineering.

A STUDY OF MICROSTRIP ANTENNAS FOR MULTIPLE BAND OPERATION Final Technical Report, 1 Jun. 1981 - 31 May 1982

Y. T. Lo, C. E. Skupien, and S. S. Zhong Griffiss AFB, N.Y. RADC Sep. 1982 133 p refs

(Grant AF-AFOSR-0234-81; AF Proj. 2305)

(AD-A122404; UILU-EM-82-3; UILU-82-2541; RADC-TR-82-236) Avail: NTIS HC A07/MF A01 CSCL 09/5

In this investigation two approaches have been studied, both theoretically and experimentally. The first investigation is made on annular microstrip antennas. As seen from the cavity model theory an antenna of this type, if excited for (1,1), (1,2) and (11,3) modes, will have predominantly broadside radiation of the same polarization. However, unlike disc or rectangular patches, the resonant frequencies for these modes are not fixed ratios, being dependent on the dimensions of the inner and outer radii. Sets of curves and tables which show this dependence are presented. In addition, the feeding methods and techniques for suppressing undesirable modes are discussed. For most microstrip antennas, such as disc and rectangle, the computer resonant frequency from the cavity model theory is always higher than the measured, due to the fringing field effect. However, for annulus, this may not be true since it has two unconnected boundaries. This is also investigated in some detail. In the second approach, a rectangular patch, excited particularly in the (0,1) and (0,3) modes, is investigated since they both produce broadside radiations of the same polarization. However, the operating frequencies for these modes are at a fixed ratio, approximately 3:1. To remove this restriction, electrically shorting pins are inserted along the modal lines in the (0,3) modal over a wide range while that of the (0,3) mode is kept unchanged. GRA

N83-22500# Rome Air Development Center, Hanscom AFB, Mass.

ADAPTIVE FEED CONTROL USING THE COMPLETELY OVERLAPPED SUBARRAY ANTENNA

Randolph E. Clapp Griffiss AFB, N.Y. Jun. 1982 21 p refs

(AF Proj. 4600)

(AD-A122573; RADC-TR-82-174) Avail: NTIS HC A02/MF A01 CSCL 17/4

The radiation pattern of the Completely Overlapped Subarray Antenna can be calculated. Knowledge of the phase and amplitude of the contribution from each element can be used to determine an appropriate weight for each element to achieve a desired pattern. The 16 feed elements on Face B of the antenna allow pattern control at 15 discrete points in the pattern. Success in using this method requires an accurate determination of the individual element contributions. Random phase and amplitude errors cannot be sensed, and, therefore, cannot be compensated

for. If the approximate angles of arrival of jamming signals are known, and the number of jammers is smaller than the number of elements in the locating array, a tan loop behind each element can determine the noise covariance matrix. A quiescent noise power level is assumed, and the adjoint of the matrix calculated. When discontinuities occur in the pattern, they indicate the directions of arrival for jamming signals. The pattern of the Overlapped Subarray Antenna may then be changed to place nulls in the directions of the jammers. Author (GRA)

N83-22501# Mitre Corp., Bedford, Mass.
GRATING LOBE CONSIDERATIONS FOR THE APATS ARRAY
G. A. Robertshaw Dec. 1982 43 p refs
(Contract F19628-82-C-0001; AF Proj. 4290)
(AD-A122583; MTR-8533; ESD-TR-82-398) Avail: NTIS HC A03/MF A01 CSCL 09/5

The spacing of the elements which comprise a phased array antenna, such as APATS, is usually selected to prevent the occurrence of grating lobes when the main beam is steered to any position within the specified field of view. Array designers may desire to use the maximum element separation consistent with grating lobe constraints in order to minimize the number of elements needed to fill a given aperture, and thereby reduce antenna cost and complexity. Analysis founded upon reciprocal (Fourier) space construction concepts commonly employed by crystallographers is used to determine the optimum element lattice for planar arrays having the nominal specified APATS field of view and boresight elevations of 10 degrees and 15 degrees respectively. The theory is discussed in sufficient detail and generality to permit application to other array systems.
Author (GRA)

N83-22502# Applied Science Associates, Inc., Apex, N. C.
FUNDAMENTAL STUDIES IN SCATTERING FROM ROUGH SURFACES Interim Report, 8 Jul. 1981 - 8 Jul. 1982
Gary S. Brown Griffiss AFB, N.Y. RADC Oct. 1982 114 p refs
(Contract F19628-81-C-0084; AF Proj. 2305)
(AD-A122584; RADC-TR-82-262) Avail: NTIS HC A06/MF A01 CSCL 20/6

This report presents interim results of a study to account for multiple scattering in the theoretical modeling of scattering from rough surfaces. Based on the magnetic field integral equation for the current induced on a perfectly conducting rough surface, a k-space integral equation for the stochastic transform of the current is derived and discussed. The mean and variance of the scattered field is shown to be directly obtainable from the stochastic transform of the current. Limiting cases of a gently undulating surface and a surface which is uniformly rough, i.e., a pseudo white noise surface, are considered in detail. An approximate approach is presented for determining the mean or coherent scattered field is produced by a uniformly rough surface and the resulting solution clearly shows the important effects of multiple scattering. For the class of surfaces for which decorrelation does not imply statistical independence, it is found that the incoherent power scattered by such surfaces comprises two parts. The first part is the conventional diffuse term while the second part is specular in that it exists only at the specular scattering angle. For a gently undulating exponentially distributed surface, the incoherent specular power is found to exceed the coherent scattered power when the Rayleigh parameter is larger than unity. GRA

N83-22503# General Atomic Co., San Diego, Calif.
ICRF ANTENNA COUPLING STUDIES
R. S. Elet and S. C. Chiu Aug. 1982 43 p refs
(Contract DE-AT03-76ET-51011)
(DE83-005154; GA-A-16848) Avail: NTIS HC A03/MF A01

A computational model is developed to study the coupling characteristics of an ion cyclotron range of frequencies (ICRF) antenna system to a reactor-size fusion plasma. DOE

N83-22504# Texas Univ., Austin. Center for Fusion Research.
SIMPLIFYING THEOREM FOR ANALYZING rf ANTENNAS WITH FEEDERS
Robert B. Michie Sep. 1982 21 p refs
(Contract DE-AS05-77ET-53042)
(DE83-000160; DOE/ET-53042/13; FRCR-250) Avail: NTIS HC A02/MF A01

An antenna Fourier decomposition for plasma coupling to RF heating antenna using some simplifying polarization conditions is given in the magnetostatic limit for cylindrical geometry. Two sets of orthogonal Fourier modes are used: one set containing no radial currents is chosen which is the usual constant radius, divergence free, surface current set, and the second set containing all the radial feed currents, which is chosen to have theta and z currents perpendicular to those of the first set. This radial current set of Fourier modes produces no magnetic field inside the plasma; hence no plasma loading. Therefore, for low frequency applications, only plasma coupling to the first set of modes, with theta and z currents at the antenna radius, needs to be calculated. This greatly simplifies the boundary conditions, and eliminates the complications of dealing with radial current components. DOE

N83-22505# Oak Ridge National Lab., Tenn. Fusion Energy Div.
ANALYSIS OF MIXED MODE MICROWAVE DISTRIBUTION MANIFOLDS
T. L. White Sep. 1982 24 p refs
(Contract W-7405-eng-26)
(DE83-000469; ORNL/TM-8127) Avail: NTIS HC A02/MF A01

A general model for mixed mode microwave distribution manifolds based on isotropic plane wave sources of varying amplitudes that are distributed toroidally around the manifold was developed. The calculated manifold transmission efficiency for the most recent EBT-S coupling iris modification is 90%. This agrees with the average measured transmission efficiency. Also, the model predicts the coupling iris areas required to balance the distribution of microwave power while maximizing transmission efficiency, and losses in waveguide feeds connecting the irises to the cavities of EBT are calculated using an approach similar to the calculation of manifold losses. The model is used to evaluate EBT-P manifold designs. DOE

N83-22506# National Bureau of Standards, Washington, D.C. Electromagnetic Fields Div.
COMPUTATION OF ANTENNA SIDE-LOBE COUPLING IN THE NEAR FIELD USING APPROXIMATE FAR-FIELD DATA
Michael H. Francis and Arthur D. Yaghjian Aug. 1982 85 p refs Sponsored in part by Electromagnetic Compatibility Analysis Center, Annapolis, Md.
(PB83-125625; NBSIR-82-1674) Avail: NTIS HC A05/MF A01 CSCL 09E

Computer programs, in particular CUPLNF and CUPLZ, are presently in existence to calculate the coupling loss between two antennas provided that the amplitude and phase of the far field are available. However, for many antennas the complex far field is not known accurately. In such cases it is nevertheless possible to specify approximate far fields from a knowledge of the sidelobe level of each antenna along the axis of separation, and the electrical size of each antenna. To determine the effectiveness of using approximate sidelobe level data instead of the detailed far fields, two hypothetical, linearly polarized, uniformly illuminated circular antennas for which the exact far fields are given by a simple analytic expression were chosen as test antennas. GRA

N83-22507# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
IONOSPHERIC DIAGNOSTICS FOR SKYWAVE SEA-STATE RADAR
Minoru Katoki and T. M. Georges May 1982 44 p refs Sponsored in part by Radio Research Labs. of Japan
(PB83-117481; NOAA-TM-ERL-WPL-97; NOAA-82101106) Avail: NTIS HC A03/MF A01 CSCL 08C

Ionospheric motions and spatial multipath distort the sea-echo spectra obtained with HF skywave radars. At the SRI-WARF radar, two sweep-frequency ionospheric diagnostics are used on-line to help select frequencies and ranges most likely to be free of such

distortion. They are a near-vertical-incidence ionogram and a ground-backscatter ionogram covering all paths within the radar beam. The authors have correlated the quality of radar spectra obtained over several days' operation with the location of the operating frequency on the two ionograms. The result is some tentative guidelines for choosing frequencies that give the sharpest spectra. Author (GRA)

N83-22508# National Telecommunications and Information Administration, Washington, D.C.
INTEGRATED SERVICES DIGITAL NETWORKS, STANDARDS AND RELATED TECHNOLOGY
D. V. Glen Jun. 1982 142 p refs
(PB83-107573; NTIA/REPT-82-103) Avail: NTIS HC A07/MF A01 CSCL 17B

National and international work toward an Integrated Services Digital Network (ISDN) and the progress toward its implementation is described. Standards activity and technology relating to the ISDN, in the United States and abroad, are presented. GRA

N83-22509# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics Div.
THE DEVELOPMENT OF AN EMAT SYSTEM FOR THE ACCURATE MEASUREMENT OF THE PHASE VELOCITY OF SHEAR WAVES
D. R. Allen and W. H. B. Cooper Oct. 1982 12 p refs
(AERE-R10628) Copyright. Avail: Issuing Activity

Some EMA transducers which were used to obtain ultrasonic phase delay measurements of shear waves to an accuracy of 0.01% and better in mild steel are described. Some novel EMA transducers are also discussed, in particular some shear horizontal (SH) wave transducers are shown to reduce the problem presented by mode converted pulses. S.L.

N83-22227*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELECOMMUNICATIONS SYSTEMS DESIGN
Joseph H. Yuen *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 1-22 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22228*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPECIAL CHARACTERISTICS OF DIGITAL MODULATIONS
Marvin K. Simon *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 23-47 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22229*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RECEIVER DESIGN AND PERFORMANCE CHARACTERISTICS
Marvin K. Simon and Joseph H. Yuen *In its* Deep Space Telcommun. Systems Eng. Jul. 1982 p 49-121 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 09C

N83-22232*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMMAND SYSTEM
Nathan A. Burow and Man K. Tam *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 343-381 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22233*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACECRAFT RADIO FREQUENCY SUBSYSTEM
Man K. Tam and Carroll F. Winn *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 383-412 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACECRAFT ANTENNAS
Yahya Rahmat-Samii and Gary K. Noreen *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 413-460 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 09C

N83-22235*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE PREDICTION OF WEATHER EFFECTS ON TELECOMMUNICATIONS LINK PERFORMANCE
Richard L. Horttor and Shlomo Dolinsky *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 461-490 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 20N

N83-22236*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TELECOMMUNICATIONS PERFORMANCE ANALYSIS AND MONITORING SOFTWARE
Jim F. Taylor *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 491-516 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22237*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIO FREQUENCY SELECTION AND INTERFERENCE PREVENTION
Norman F. deGroot *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 517-555 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 20N

N83-22238*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACE SHUTTLE AND TDRSS TELECOMMUNICATIONS SYSTEM INTERFACES
James C. Springett (Neocomm Systems, Inc.) and Peter W. Kinman *In its* Deep Space Telecommun. Systems Eng. Jul. 1982 p 557-596 refs (For primary document see N83-22226 12-12)
Avail: NTIS HC A99/MF A01 CSCL 17B

N83-22308*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
STS-3/OSS-1 PLASMA DIAGNOSTICS PACKAGE (PDP) MEASUREMENTS OF ORBITER TRANSMITTER AND SUBSYSTEM ELECTROMAGNETIC INTERFERENCE
Stanley D. Shawhan and Jerry Murphy *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 17 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 09C

N83-22668# Hokkaido Univ., Sapporo (Japan).
OBSERVATIONS OF RADAR ECHO PROPAGATED ON A SEA-ICE FIELD
Masayuki Oi, Hiroki Fukushi, and Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 191-198 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N83-22510# McGraw-Hill Book Co., Inc., New York.
POWER FACTOR CONTROLLERS

1982 4 p
Avail: NTIS HC A02/MF A01

The power factor controller (PFC) is a solid state electronic device that reduces excessive energy waste in ac induction motors. The significance of the PFC lies in the fact that nearly a billion induction motors are used daily. The PFC is applicable to both single phase and three phase induction motors. Since it is connected to the power lines of the motor and requires no modification to the motor itself, it may be applied to existing motors as well as to new installations. B.G.

N83-22511# National Electrical Engineering Research Inst., Pretoria (South Africa).
THE DEVELOPMENT OF AN UNCOMMITTED INTEGRATED CIRCUIT FOR COMBINED DIGITAL AND ANALOGUE APPLICATIONS
A. J. Kemp Jun. 1982 222 p refs
(CSIR-ELEK-243; ISBN-0-7988-1714-3) Avail: NTIS HC A10/MF A01

An uncommmited integrated circuit is a standardized integrated circuit needing only a fraction of the normal processing steps to program it for a required application. The result is a reduction in the time, money and knowledge required to develop an integrated circuit. The development and industrialization of an uncommitted circuit for combined digital and analog applications are described. Integrated Injection Logic (I2L) is used to realize digital functions, and standard analog techniques, based on a bipolar process, are used to realize analog functions. A novel architecture, as well as the use of three masks to realize a required interconnection pattern, results in a very high efficiency in terms of the number of components that was used. B.G.

N83-22512# National Electrical Engineering Research Inst., Pretoria (South Africa).
SOME ANALOG INTEGRATED CIRCUIT BUILDING BLOCKS AND CIRCUIT TECHNIQUES
E. Seevinck Oct. 1981 52 p
(CSIR-ELEK-229; ISBN-0-7988-1711-9) Avail: NTIS HC A04/MF A01

The design of electronic circuits for integration, (particularly those of the analog variety) differs in some important respects from the techniques used for discrete circuits. Several techniques which were found useful in this context are provided. In addition, some equivalents for industry standard circuits, realized with in house IC process IA, are described. The mask sets for these circuits were already prepared and the circuits can therefore be produced at short notice to be used instead of the particular commercial types. The circuits and circuit techniques that are described were thoroughly investigated. Most were integrated (in these cases the mask numbers are provided); some, however, were studied through computer and/or breadboard simulation. Since a circuit's performance may be affected by other parts of the system of which it will form a part, no performance guarantee can be given for the circuits described here. Neither can any responsibility be taken for maloperation. S.L.

N83-22513# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CALCULATION OF ELECTRON TRAJECTORIES IN A MICROWAVE CAVITY [CALCULO DA TRAJETORIA DE ELETRONS EM UMA CAVIDADE DE MICROONDAS]
Joaquim Jose Barroso deCastro and Antonio MontesFilho Mar. 1983 19 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Encontro Regional de Mat. Aplicada e Computacional, Sao Jose dos Campos, Brazil, Feb. 1983
(INPE-2677-PRE/283) Avail: NTIS HC A02/MF A01

The relativistic equation describing the motion of electrons of a beam with annular cross section in the electromagnetic field of a cylindrical guide operating at TE sub 021 mode is solved numerically. Calculating the electrons energy along the cavity, the processes of energy exchange between the RF fields and the beam are investigated. It is verified that the energy extracted by the electromagnetic fields in the resonant cavity comes from the transverse rotational energy of the electrons. Author

N83-22514*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHEMICAL ETCHING FOR AUTOMATIC PROCESSING OF INTEGRATED CIRCUITS
Bobby W. Kennedy Apr. 1981 20 p
(NASA-TM-82411; NAS 1.15:82411) Avail: NTIS HC A02/MF A01 CSCL 09C

Chemical etching for automatic processing of integrated circuits is discussed. The wafer carrier and loading from a receiving air track into automatic furnaces and unloading onto a sending air track are included. S.L.

N83-22515*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EVALUATION OF GOES ENCODER LAMPS
Walter Viehmann and Norman Helmold Mar. 1983 27 p
(NASA-TM-85002; NAS 1.15:85002) Avail: NTIS HC A03/MF A01 CSCL 09A

Aging characteristics and life expectancies of flight quality, tungsten filament, encoder lamps are similar to those of 'commercial' grade gas filled lamps of similar construction, filament material and filament temperature. The aging and final failure by filament burnout are caused by single crystal growth over large portions of the filament with the concomitant development of facets and notches resulting in reduction of cross section and mechanical weakening of the filament. The life expectancy of presently produced lamps is about one year at their nominal operating voltage of five volts dc. At 4.5 volts, it is about two years. These life times are considerably shorter, and the degradation rates of lamp current and light flux are considerably higher, than were observed in the laboratory and in orbit on lamps of the same type manufactured more than a decade ago. It is speculated that the filaments of these earlier lamps contained a crystallization retarding dopant, possibly thorium oxide. To obtain the desired life expectancy of > or = to four years in present lamps, operating voltages of < or = to four volts dc would be required. S.L.

N83-22516# Varian Associates, Palo Alto, Calif.
MBE IN MOS TECHNOLOGY APPLIED TO SPEED INCREASES IN VHSICS Final Report
Timothy J. Maloney Sep. 1982 36 p refs
(Contract N00014-81-C-2598)
(AD-A122446) Avail: NTIS HC A03/MF A01 CSCL 20/8

Silicon molecular beam epitaxy (MBE) was used to grow submicron undoped epitaxial Si layers on 2 inch Si substrates. The films had low defect densities. Radiative wafer heating was used, and no temperatures above 900 C were necessary. In addition, the single crystal silicon suboxides Si2O and Si2O3 were grown by MBE for the first time on (111) and (100) Si substrates, with Si2O growing primarily on the (111) wafers. Undoped Si films were characterized for defects with a Wright etch, and for doping and thickness with spreading resistance. The single crystal suboxides were identified by interpreting reflection electron diffraction (RED) patterns and by comparing Auger spectra with published data for amorphous SIPOS (semi-insulating polysilicon) films containing the same compounds. Capacitance-voltage results show MOS-type behavior, although with charge injection and some conductivity of the suboxide. The Si2O crystalline structure on (111) Si may be thought of as oxygen planes between double (111) planes of Si, with a 180 deg Si-O-Si bond. Crystalline Si2O3 is an assembly in a Si-like lattice of Si4O6 molecules, each of which has one tetrahedral bond per silicon atom. All other Si bonds are satisfied by 109.5 deg Si-O-Si bonds. GHA

N83-22517# Boeing Aerospace Co., Seattle, Wash.
HIGH VOLTAGE TESTING. VOLUME 2: SPECIFICATIONS AND PROCEDURES Final Report, 29 Sep. 1979 - 1 Jul. 1982
W. G. Dunbar Wright-Patterson AFB, Ohio AFWAL Aug. 1982 463 p

(Contract F33615-79-C-2067; AF Proj. 3145)
(AD-A122355; AFWAL-TR-82-2057-Vol-2) Avail: NTIS HC A20/MF A01 CSCL 10/2

The High Voltage Design Guide and High Voltage Specifications and Tests Documents referred to in this report pertain to high voltage/high power airborne equipment. A test plan was designed to evaluate and verify test parameters specified in these documents. This was done by writing detailed test procedures obtaining representative test samples, and testing the specified parameters. This report is a revision of the High Voltage Specifications and Tests Document (AFAPL-TR-79-2024) which reflects the findings of the High Voltage Testing portion of the program. GRA

N83-22518# Boeing Aerospace Co., Seattle, Wash.
HIGH VOLTAGE TESTING. VOLUME 3: GENERATOR TEST PROCEDURE Final Report, 29 Sep. 1979 - 1 Jul. 1982
W. G. Dunbar Wright-Patterson AFB, Ohio AFWAL Jul. 1982 28 p
(Contract F33615-79-C-2067; AF Proj. 3145)
(AD-A122356; AFWAL-TR-82-2057-Vol-3) Avail: NTIS HC A03/MF A01 CSCL 10/2

The high voltage testing specifications and test procedures document referred to in this report pertains to high voltage/high power airborne equipment. A test plan was developed to apply the test parameters of said document to a specific high power generator prototype design. This test procedure covers the general high voltage tests required for the high voltage stator coils and assembly in this high power alternating current, three phase generator. GRA

N83-22519# Lockheed Electronics Co., Plainfield, N. J.
VALIDATION OF MAINTAINABILITY PREDICTION Final Technical Report, Mar. 1981 - Feb. 1982
W. DuBlanica, J. Kubeck, and E. Edwards Griffiss AFB, N.Y. RADC Sep. 1982 109 p refs
(Contract F30602-81-C-0081)
(AD-A123707; RADC-TR-82-185) Avail: NTIS HC A06/MF A01 CSCL 09/3

Validation of maintainability prediction techniques was performed. The techniques for preliminary and detailed predictions were applied to three (3) representative samples of electronic equipment. The detailed predictions were then compared with demonstrated field performance on equipments that have in excess of one million system hours of combined operation. The time synthesis prediction technique proved to be a distinct improvement in maintainability prediction methodology over existing techniques. In addition, the time synthesis model provides a structured means of assessing the maintainability design in its early and final stages, thereby determining if the system maintainability requirements will be achieved. The standards for removal and replacement actions were analyzed in detail and modifications recommend. GRA

N83-22520# Sandia Labs., Albuquerque, N. Mex. Geothermal Technology Development Div.
HIGH-TEMPERATURE ELECTRONIC COMPONENTS AND CIRCUIT DESIGNS
H. T. Chang 1982 5 p refs Presented at the 32nd Electron. Components Conf., San Diego, Calif., 10 May 1982
(Contract DE-AC04-76DP-00789)
(DE82-007764; SAND-81-2505C; CONF-820521-1) Avail: NTIS HC A02/MF A01

Downhole logging instruments for geothermal application must have electronic circuits capable of operating from room temperature 250 C. A nondestructive evaluation instrument for geothermal wells requires a circuit that can be operated at high voltage and high current in order to provide high power output. In designing such a circuit, a high power, high speed, cold cathode switching tube was developed to be used as a substitute for SCRs or thyratrons. The possibility of using low leakage JFETs beyond their rated temperature in a circuit design is discussed. Commercial high temperature components are reviewed. DOE

N83-22521# Sandia Labs., Livermore, Calif.
PROGRAMMABLE dc MOTOR CONTROLLER
J. E. Hopwood Nov. 1982 16 p refs
(Contract DE-AC04-76DP-00789)
(DE83-003307; SAND-82-8029) Avail: NTIS HC A02/MF A01

A portable programmable dc motor controller, with features not available on commercial instruments was developed for controlling fixtures during welding processes. The controller can be used to drive any dc motor having tachometer feedback and motor requirements not exceeding 30 volts, 3 amperes. Among the controller's features are delayed start time, upslope time, speed, and downslope time. DOE

N83-22522# Florida Univ., Gainesville.
LIGHTNING PROTECTION OF DISTRIBUTION SYSTEMS Final Report
Mat Darveniza and Martin A. Uman Sep. 1982 47 p refs
(Contract DE-AS01-78ET-29066)
(DE83-003979; DOE/ET-19066/1) Avail: NTIS HC A03/MF A01

Research work on the lightning protection of distribution systems is described. The rationale behind the planning of the first major phase of the work - the field experiments conducted in the Tampa Bay area during August 1978 and July to September 1979 is explained. The aims of the field work were to characterize lightning in the Tampa Bay area, and to identify the lightning parameters associated with the occurrence of line outages and equipment damage on the distribution systems of the participating utilities. The equipment developed for these studies is fully described. The field work provided: general data on lightning - e.g., electric and magnetic fields of cloud and ground flashes; data from automated monitoring of lightning activity; stroke current waveshapes and peak currents measured at distribution arresters; and line outage and equipment damage on 13 kV networks in the Tampa Bay area. Computer aided analyses were required to collate and to process the accumulated data. The computer programs developed for this work are described. DOE

N83-22523# Booz-Allen and Hamilton, Inc., Cleveland, Ohio.
IMPROVED MOTORS FOR UTILITY APPLICATIONS. VOLUME 2: INDUSTRY ASSESSMENT STUDY Final Report
P. Mighdoll, R. P. Bloss, and F. Hayashi Oct. 1982 253 p refs Sponsored by EPRI
(EPRI Proj. 1763-1)
(DE83-900561; EPRI-EL-2678-Vol-2) Avail: NTIS HC A12/MF A01

Auxiliary drive motor failures in electric utility applications result in large repair costs and energy replacement costs. In order to assess the motor reliability experience of the utility industry and identify specific problem areas, computerized databases were established for all fuel sources, geographic factors and motor manufacturers. Failures of specific components in certain specific applications appear to be associated with specific manufacturers. However, overall, 22% of all reported failures were attributed to winding failure and 13% to sleeve bearings. Numerous examples of misapplication were discovered such as the horizontal motor which was vertically mounted by an OEM, inadequately balanced hydraulic thrust loads in a packaged motor/pump system and inappropriate enclosure specified for a motor located outdoors. The internal procedures and practices of those utilities which had particularly low failure rate experience included such factors as stringent specifications, objective purchasing policies, adequate record keeping and preventative maintenance programs. B.G.

N83-22524# General Electric Co., Schenectady, N. Y.
IMPROVED MOTORS FOR UTILITY APPLICATIONS Final Report
E. P. Cornell, E. L. Owen, J. C. Appiarius, R. M. McCoy, P. F. Albrecht, and D. W. Houghtaling Oct. 1982 182 p refs
(EPRI Proj. 1763-1)
(DE83-900560; EPRI-EL-2678-Vol-1) Avail: NTIS HC A09/MF A01

The reliability and performance of powerhouse motors was evaluated and design and operational characteristics which, through advanced development, offer the potential of increased reliability, performance, and efficiency were identified. A data base of utility

motor applications, operating factors, failures, causes of failures, and impacts of failures on the operation of the generating station was developed. A survey of 132 generating units was conducted and data on 4800 low and medium voltage motors with ratings greater than 100 hp was obtained. Results are presented relating motor failures to units, utilities, manufacturers, and applications. A separate survey was undertaken with the goal of documenting utility industry experience in using vacuum devices to switch motors in generating station auxiliaries systems. Eleven utilities were identified as having installations involving vacuum switching devices at 12 generating stations representing 122 motors. DOE

N83-22525# Westinghouse Electric Corp., Bloomfield, N.J.
ENERGY-EFFICIENT COMPACT SCREW-IN FLUORESCENT LAMP Final Report
E. W. Morton Nov. 1982 26 p refs
(Contract DE-AC03-76SF-00098)
(DE83-004465; LBL-15252) Avail: NTIS HC A03/MF A01

A compact fluorescent lamp has been designed and constructed which can replace an incandescent lamp. The lamp is slightly larger than a standard lamp (6 3/4 in. x 3 1/4 in.), but is designed to fit a majority of portable lamp applications. This version, with a core-coil ballast, results in a system efficacy of 54 lumens per watt, with a light output of more than 1800 lumens. This compares favorably with a 100-watt incandescent (17.5 lumens per watt and 1750 lumens light output). The color temperature of 30000K is compatible with an incandescent lamp (28000K). The color rendition index (CRI) is 84. With a solid-state ballast, the efficacy and light output could be increased by 20% (65 l/w, 2200 lumens) and could provide a direct replacement for a three-way, 150-watt incandescent lamp (15 l/w, 2200 lumens). DOE

N83-22526# California Univ., Berkeley. Lawrence Berkeley Lab. Lighting Systems Research.
INTEGRATED-CIRCUIT CONTROL FOR TWO-LAMP ELECTRONIC BALLAST Final Report
Thomas P. Kohler Nov. 1982 13 p
(Contract DE-AC03-76SF-00098)
(DE83-004466; LBL-15251) Avail: NTIS HC A02/MF A01

Circuitry is described for a solid-state, high-frequency fluorescent ballast designed to operate two F40 T-12 rapid-start lamps. The circuits are designed to be produced by hybrid integrated circuit (IC) technology. The signal components are produced on a single IC chip; the power transistors are attached to an alumina substrate. The initial IC version reduces the component count by about 50%. The cost of each IC in 500 K lots is $0.70, replacing discrete parts costing $2.25. Additional savings of more than $1.00 per unit are realized by the decreased assembly time and improved reliability of the ICs. The system performance (two-lamp F40) was compared to the discrete version of the ballast and to an efficient core-coil ballast and found to be 6% less and 20% more efficient, respectively. The decrease in efficiency relative to the discrete version of the ballast is due to retaining some power to the filament during operation in order to maintain normal lamp life. DOE

N83-22527# Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.
FAST A/D CONVERSION AND PROCESSING SYSTEM BASED ON VIDEO DIGITIZING OF OSCILLOSCOPE TRACES Progress Report, Jul. 1981 - Jun. 1982
A. R. Avitzour 1982 47 p refs
(Contract DE-AC02-76EV-03221)
(DE83-004779; DOE/EV-03221/73) Avail: NTIS HC A03/MF A01

The need for a reasonably priced, fast digitizing instrument, suitable for capture and processing of fast single shot transients, led to the development and construction of the RADIAN SYSTEM (completed recently). Following former systems, such SANDIA's the system is based on a TV camera attached optically to an oscilloscope screen, and on logic circuits for digitizing by processing of the video signal. The oscilloscope in our system is TEKTRONIX 7844 DUAL BEAM. Both digitizing and display of the system are dual channel. Efforts have been made to make the system self-contained and of relatively low cost. The system has its own, though limited, built-in interactive graphic and alphanumeric terminal, and for both characters and transient data it is interfaced as a teletype. Therefore, there is no need to build a special interface while connecting the system to a computer. Furthermore, it can be easily connected to different computers. DOE

N83-22528# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SERIES RESISTANCE ASSOCIATED WITH THICK-FILM CONTACTS TO SOLAR CELLS
S. J. Hogan, K. Firor, J. M. Barrett, and R. T. Coyle Sep. 1982 6 p refs Presented at the 16th IEEE Photovoltaic Specialists Conf., San Diego, Calif., 27-30 Sep. 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-001728; SERI/TP-212-1718; CONF-820906-27) Avail: NTIS HC A02/MF A01

A high series resistance is often associated with thick film contacts on solar cells. A study of the thick film silver/silicon interface of a single crystal silicon solar cell is presented. Series and contact resistance measurements and scanning electron microscopy, in conjunction with hydrofluoric acid etching of cells, lead toward an understanding of the silver/silicon interface and of the barriers to current flow. DOE

N83-22529# Westinghouse Research and Development Center, Pittsburgh, Pa.
MATERIALS RESEARCH FOR HYDROGEN-COOLED SUPERCONDUCTING POWER-TRANSMISSION LINES (SPTL). PART 1: LIQUID HYDROGEN AS A DIELECTRIC. PART 2: SUPERCONDUCTING MATERIALS Annual Report, 1 Jan. - 31 Dec. 1981
24 Feb. 1982 127 p refs
(Contract DE-AC02-79ET-29354)
(DE83-004801; DOE/ET-29354/3) Avail: NTIS HC A07/MF A01

A system for electric breakdown and dielectric loss measurement in liquid H2 was designed and constructed. It was shown experimentally that Nb3Ge superconductor can be fabricated with electrical and mechanical properties suitable for use in LH2-cooled SPTL's. DOE

N83-22530# Sandia Labs., Albuquerque, N. Mex. Plasma Theory Div.
SPACE AND SURFACE CHARGE EXCITATION OF A SLANTED DIELECTRIC INTERFACE BETWEEN TWO ELECTRODES
David B. Seidel and Catherine L. Levinson Sep. 1982 44 p refs
(Contract DE-AC04-76DP-00789)
(DE83-000802; SAND-82-1678) Avail: NTIS HC A03/MF A01

The two-dimensional, electrostatic problem of a planar dielectric interface between two perfectly conducting plates was solved numerically. The solution allows for an arbitrary interface angle relative to the plates as well arbitrary distributions of both charge within the volume and surface charge along the interface. The problem is treated by first converting the governing differential equations to a pair of coupled integral equations using Green's function techniques, then solving these integral equations numerically using moment methods. The work was motivated by the need to understand the physics of dielectric breakdown by flashover in high voltage insulator applications. Of particular interest is the physics associated with magnetic flashover inhibition (MFI), a possible method of significantly increasing insulator breakdown strength above that possibly using currently proven technologies. DOE

N83-22531# California Univ., Livermore. Lawrence Livermore Lab.
REGULATION AND DRIVE SYSTEM FOR HIGH REP-RATE MAGNETIC-PULSE COMPRESSORS
D. L. Birx, E. G. Cook, S. Hawkins, A. Meyers, L. L. Reginato, J. A. Schmidt, and M. W. Smith 12 May 1982 18 p refs Presented at 15th Power Modulator Symp., Baltimore, 14 Jun. 1982

(Contract W-7405-eng-48)
(DE83-000021; UCRL-87264; CONF-820626-12) Avail: NTIS HC A02/MF A01

The essentially unlimited rep rate capability of nonlinear magnetic systems has imposed strict requirements on the drive system which initiates the pulse compression. An order of magnitude increase in the rep rates achieved by the advanced test accelerator gas blown system is not difficult to achieve in the magnetic compressor. The added requirement of having a high degree of regulation at the higher rep rates places strict requirements on the triggerable switch for charging and de-Queing. A feedback technique which applies the proper bias to a magnetic core by comparing a reference voltage to the charging voltage eases considerably the regulation required to achieve low jitter in magnetic compression. The performance of the high rep rate charging and regulation systems is described. DOE

N83-22532# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
NEW APPROACH FOR THE ANALYSIS AND CONTROL OF MULTITERMINAL AC-DC NETWORKS Final Report
D. P. Caroll and C. M. Ong Sep. 1982 79 p refs
(Contract DE-AS01-78CE-30685)
(DE83-000443; DOE/CE-30685/1) Avail: NTIS HC A05/MF A01

Development of techniques and analytical tools for utilizing the inherent controllability of multiterminal hvdc transmission to enhance the performance of an integrated ac/dc power system were explored. Specific investigations that were performed during the course of the project were described, including steady state operation of ac/dc systems, and multiterminal power modulation. B.G.

N83-22533# Eaton Corp., Southfield, Mich. Engineering and Research Center.
REGENERATIVE BRAKING THROUGH ELASTOMERIC ENERGY STORAGE
Lyle O. Hoppie 1982 6 p ref Presented at the Energy Storage Contractors Rev. Meeting, Arlington, Va., 23 Aug. 1982
(Contract W-7405-eng-26)
(DE82-020806; CONF-820827-24) Avail: NTIS HC A02/MF A01

The project goals are to improve the energy density and fatigue life of the elastomeric units through elastomer formulations and fabrication technique research, and to verify that a compact method of attachment is feasible in full-size units. Samples of a new compound have shown an improvement of 100% in energy density as compared with the previous compound. The energy density, hysteresis loss, and fatigue life of fullsize units fabricated with this compound will be measured during the project. Molding techniques commonly used within the rubber industry give rise to surface flaws on the finished energy storage units, and these surface flaws have been indentified as sources of subsequent fatigue failure. A molding technique aimed at minimizing surface flaws will be investigated during this project. Small-scale energy storage units were used to carry out a comparison of compact attachment concepts. One concept has been selected and will be incorporated into full-size units for test and evaluation during this project. DOE

N83-22534# Lincoln Lab., Mass. Inst. of Tech., Lexington. Electric Power Systems Engineering Lab.
PHOTOVOLTAIC 1-5 CURVE MEASUREMENT TECHNIQUES
C. H. Cox and T. H. Warner Aug. 1982 26 p refs
(Contract DE-AC02-76ET-20279)
(DE83-000447; DOE/ET-20279/215) Avail: NTIS HC A03/MF A01

Performance evaluation of photovoltaic (PV) arrays under actual field conditions provides important feedback to the module design process. One of the principal methods for assessing an array's performance is to plot its current, I, versus voltage, V, curve. Following a brief review of techniques for measuring the I-V curve, a new, capacitive-based approach is presented. It use a rapid sweep of the I-V curve that substantially reduced the average power transfer between array and load, and in turn, substantially reduced the size and weight of the curve tracer. Both theoretical and practical aspects of the approach are presented for a 10-kW unit. Performance is verified by comparison with I-V curves obtained by using a conventional load. The agreement is found to be excellent. Approximately an order of magnitude reduction in size, weight and power consumption over conventional units was realized with the experimental I-V curve tracer. DOE

N83-22535# Sandia Labs., Albuquerque, N. Mex.
NEW PROCESS FOR PREPARING COMPLEX-SHAPED DIELECTRIC FILM SIMILAR TO MYLAR
Robert R. Lagasse and Andrew M. Kraynik Feb. 1982 52 p refs
(Contract DE-AC04-76DP-00789)
(DE82-014256; SAND-81-2110) Avail: NTIS HC A04/MF A01

A new thermoforming/heat-treatment process yields complex-shaped dielectric film having electrical and shrinkage properties similar to those of flat Mylar film. This similarity should extend to other physical properties because the new process is directly analogous to the process used to prepare Mylar. Commercially available poly(ethylene terephthalate) film is formed into a cavity at approx. 110 C and then heat treated at approx. 180 C. A laboratory-scale forming apparatus has produced cylindrically shaped films having depth/diameter ratio approx. 1, a tapered wall-section, and variation in wall thickness of < 3X. Evaluation of other forming methods suggest that the production rate and thickness uniformity can be improved with existing technology. Thermal shrinkage at 150 C, 1 kHz dielectric constant from -55 to +70 C, leakage current at 1 kV, and breakdown voltage have been measured for both the complex-shaped film and Mylar. DOE

N83-22536# Brown Boveri Electric, Inc., Chalfont, Pa.
SUPERCONDUCTING FAULT-CURRENT LIMITER
Feb. 1982 548 p refs
(Contract DE-AC01-78ET-29063)
(DE82-014511; DOE/ET-29063/1) Avail: NTIS HC A23/MF A01

The use of superconductivity to limit fault currents in power systems was examined. The various types of superconducting fault current limiters (SCFCL) were identified through a literature search, then analyzed and compared. The following design parameters were developed: 2.75 ohms, 118 kV (rms, 163 MJ for resistive limiters; 14.5 mH, 110 kV (rms), 8.3 MJ for inductive limiters. The operating characteristics of the resistive SCFCL were derived using transient circuit and heat transfer analysis. Evaluation of SCFCL performance and materials evaluation are discussed. Nb3Sn on a sapphire substrate appears to be the most promising material. No insurmountable obstacles to the development of an SCFCL were revealed. A substantial amount of detailed design and process development will be required before a fully rated module is built for power testing. DOE

N83-22537# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
BIBLIOGRAPHY OF THE NBS ELECTROMAGNETIC FIELDS DIVISION PUBLICATIONS
Kathryn A. Gibson, ed. and Charles K. S. Miller, ed. Aug. 1982 20 p
(PB83-119776; NBSIR-82-1673) Avail: NTIS HC A02/MF A01 CSCL 09E

This bibliography lists the publications of the personnel of the NBS Electromagnetic Fields Division in the period from January 1980 through December 1981. GRA

N83-22538# AEG-Telefunken, Heilbronn (West Germany). Geschaftsbereich Halbleiter.
LARGE SCALE PRODUCTION METHODS FOR OPTO-ELECTRONIC COMPONENTS
W. Schoeberl Oct. 1982 58 p refs Transl. into ENGLISH of the mono. "GroBtechnische Fertigungsverfahren fuer Optoelektronische Bauelemente" Nov. 1980 80 p Sponsored by Bundesministerium fuer Forschung und Technologie
(PB83-117838; BMFT-FB-T-80-088) Avail: NTIS HC A04/MF A01 CSCL 09A

The report deals with various aspects of a project concerned with the development of large scale production methods for optoelectronic components are developed. These aspects cover the measurement of light parameters, the method of dicing component wafers, the encapsulation of devices, and measurement techniques for final testing.

N83-22539# National Bureau of Standards, Washington, D.C. Statistical Engineering Div.
MEASUREMENT ASSURANCE FOR DIMENSIONAL MEASUREMENTS ON INTEGRATED-CIRCUIT PHOTOMASKS Final Report
Carroll Croarkin and Ruth N. Varner Aug. 1982 53 p refs (PB83-111070; NBS-TN-1164) Avail: NTIS HC A04/MF A01 CSCL 13H

Optical microscope linewidth measurement standards, SRM-474 and SRM-475, were developed by NBS for optical imaging systems capable of making line spacing and linewidth measurements in the 0.5 micrometer, 12 micrometers regime on IC photomasks. Each artifact affords a means of reducing systematic errors via a calibration curve and keeping the optical system in statistical control. Procedures are given for accomplishing these goals along with a discussion of the uncertainty of the calibrated values. GRA

N83-23019# Natal Univ., Durban (South Africa). Dept. of Electrical Engineering.
OPTIMAL AND MULTIVARIABLE CONTROL OF A TURBOGENERATOR
M. A. Lahoud, R. G. Harley, and A. Secker *In* NRIMS Symp. on Control Theory and Appl. 1982 26 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23020# Rand Afrikaans Univ., Johannesburg (South Africa). Fakulteit Ingenieruswese.
STRATEGY FOR THE DYNAMIC CONTROL OF A MULTIPHASE INDUCTION MACHINE [STRATEGIE VIR DIE SINAMIESE BEHEER VAN 'N MULTIFASE INDUKSIEMASJIEN]
J. Du. Rand, J. J. Krueger, and J. D. VanWyk *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N83-22540# British Library Lending Div., Boston Spa (England).
CHARACTERISTICS OF A CASCADE IMPACTOR UNDER SPECIFIC CONDITIONS
Hideo Yoshida, Hiroaki Masuda, and Koichi Iinoya 7 Jan. 1983 16 p refs Transl. into ENGLISH from Funcai Kogakkaishi (Japan), v. 19, 1982 p 277-283
(BLL-WH-538-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

If a dust current is blown out of a nozzle and collides with a flat plate, particles larger than a certain dimension will collide with and be captured by the flat plate, and particles smaller than that will entrain an air current and go astray without colliding with the flat plate. It is therefore possible to measure particle size distribution with the use of a set of impactors, each consisting of a nozzle for classifying a smaller particle size and a flat plate. However, this measurement of size distribution of almost monodispersed particles with an impactor differs from true particle size distribution, because particle size classification does not change rapidly from 0 to 1. The magnitude of theoretical errors in the measurement of size distribution of almost monodispersed particles with impactors, experiments relating to maximum suction flow rate, and a variation in the theoretical diameter of a particle which is collected with a 50% accuracy measured with impactors at high altitude (low temperature and pressure) are presented. It is assumed that the impactors are free from rescattering, rebound, and wall losses. S.L.

N83-22541*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN, FABRICATION AND TEST OF LIQUID METAL HEAT-PIPE SANDWICH PANELS
Al Basiulis (Hughes Aircraft Co., Torrance, Calif.) and Charles J. Camarda Apr. 1983 9 p refs Presented at AIAA/ASME 3rd Joint Thermophys., Fluids, Plasma and Heat Transfer Conf., St. Louis, 7-11 Jun. 1982 Prevously announced in IAA as A82-31898
(NASA-TM-84631; NAS 1.15:84631) Avail: NTIS HC A02/MF A01 CSCL 20D

Integral heat-pipe sandwich panels, which synergistically combine the thermal efficiency of heat pipes and the structural efficiency of honeycomb sandwich panel construction, were fabricated and tested. The designs utilize two different wickable honeycomb cores, facesheets with screen mesh sintered to the internal surfaces, and potassium or sodium as the working fluid. Panels were tested by radiant heating, and the results indicate successful heat pipe operation at temperatures of approximately 922K (1200F). These panels, in addition to solving potential thermal stress problems in an Airframe-Integrated Scramjet Engine, have potential applications as cold plates for electronic component cooling, as radiators for space platforms, and as low distortion, large area structures. Author

N83-22542*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALOGY BETWEEN FLUID CAVITATION AND FRACTURE MECHANICS
R. C. Hendricks, R. L. Mullen (Case Western Reserve Univ.), and M. J. Braun (Akron Univ., Ohio) 1983 26 p refs Presented at the Thermal Eng. Joint Conf., Honolulu, Hawaii, 20-24 Mar. 1983; sponsored by ASME and Japan Society of Mechanical Engineers
(NASA-TM-83071; E-1519; NAS 1.15:83071) Avail: NTIS HC A03/MF A01 CSCL 20D

When the stresses imposed on a fluid are sufficiently large, rupture or cavitation can occur. Such conditions can exist in many two-phase flow applications, such as the choked flows, which can occur in seals and bearings. Nonspherical bubbles with large aspect ratios have been observed in fluids under rapid acceleration and high shear fields. These bubbles are geometrically similar to fracture surface patterns (Griffith crack model) existing in solids. Analogies between crack growth in solid and fluid cavitation are proposed and supported by analysis and observation (photographs). Healing phenomena (void condensation), well accepted in fluid mechanics, have been observed in some polymers and hypothesized in solid mechanics. By drawing on the strengths of the theories of solid mechanics and cavitation, a more complete unified theory can be developed. Author

N83-22543*# Texas A&M Univ., College Station.
THERMTRAJ: A FORTRAN PROGRAM TO COMPUTE THE TRAJECTORY AND GAS FILM TEMPERATURES OF ZERO PRESSURE BALLOONS
Walter J. Horn and Leland A. Carlson Feb. 1983 87 p refs (Contract NAS6-3072)
(NASA-CR-168342; NAS 1.26:168342; TAMRF-4217-81-02) Avail: NTIS HC A05/MF A01 CSCL 20D

A FORTRAN computer program called THERMTRAJ is presented which can be used to compute the trajectory of high altitude scientific zero pressure balloons from launch through all subsequent phases of the balloon flight. In addition, balloon gas and film temperatures can be computed at every point of the flight. The program has the ability to account for ballasting, changes in cloud

cover, variable atmospheric temperature profiles, and both unconditional valving and scheduled valving of the balloon gas. The program was verified for an extensive range of balloon sizes (from 0.5 to 41.47 million cubic feet). Instructions on program usage, listing of the program source deck, input data and printed and plotted output for a verification case are included. S.L.

N83-22544*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

USE OF CYBER 203 AND CYBER 205 COMPUTERS FOR THREE-DIMENSIONAL TRANSONIC FLOW CALCULATIONS

N. Duane Melson and James D. Keller Apr. 1983 17 p refs

(NASA-TM-84604; L-15553; NAS 1.15:84604) Avail: NTIS HC A02/MF A01 CSCL 20D

Experiences are discussed for modifying two three-dimensional transonic flow computer programs (FLO 22 and FLO 27) for use on the CDC CYBER 203 computer system. Both programs were originally written for use on serial machines. Several methods were attempted to optimize the execution of the two programs on the vector machine: leaving the program in a scalar form (i.e., serial computation) with compiler software used to optimize and vectorize the program, vectorizing parts of the existing algorithm in the program, and incorporating a vectorizable algorithm (ZEBRA I or ZEBRA II) in the program. Comparison runs of the programs were made on CDC CYBER 175. CYBER 203, and two pipe CDC CYBER 205 computer systems. S.L.

N83-22545*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ANALYSIS OF AEROTHERMAL LOADS ON SPHERICAL DOME PROTUBERANCES

George C. Olsen and R. E. Smith Apr. 1983 13 p refs Presented at 18th AIAA Thermophys. Conf., Montreal, 1-3 Jun. 1983

(NASA-TM-846556; NAS 1.15:846556; AIAA-83-1557) Avail: NTIS HC A02/MF A01 CSCL 20D

Hypersonic flow over spherical dome protuberances was investigated to determine increased pressure and heating loads to the surface. The configuration was mathematically modeled in a time-dependent three-dimensional analysis of the conservation of mass, momentum (Navier-Stokes), and energy equations. A boundary mapping technique was used to obtain a rectangular parallelepiped computational domain, a MacCormack explicit time-split predictor-corrector finite difference algorithm was used to obtain solutions. Results show local pressures and heating rates for domes one-half, one, and two boundary layer thicknesses high were increased by factors on the order of 1.4, 2, and 6, respectively. Flow over the lower dome was everywhere attached while flow over the intermediate dome had small windward and leeside separations. The higher dome had an unsteady windward separation region and a large leeside separation region. Trailing vortices form on all domes with intensity increasing with dome height. Discussion of applying the results to a thermally bowed thermal protection system are presented. A.R.H.

N83-22546*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

STOCHASTIC DIFFERENTIAL EQUATIONS AND TURBULENT DISPERSION

Paul A. Durbin Apr. 1983 72 p refs

(NASA-RP-1103; E-1425; NAS 1.61:1103) Avail: NTIS HC A04/MF A01 CSCL 20D

Aspects of the theory of continuous stochastic processes that seem to contribute to an understanding of turbulent dispersion are introduced and the theory and philosophy of modelling turbulent transport is emphasized. Examples of eddy diffusion examined include shear dispersion, the surface layer, and channel flow. Modeling dispersion with finite-time scale is considered including the Langevin model for homogeneous turbulence, dispersion in nonhomogeneous turbulence, and the asymptotic behavior of the Langevin model for nonhomogeneous turbulence. A.R.H.

N83-22547*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EXPERIMENTAL AERODYNAMIC HEATING TO SIMULATED SHUTTLE TILES

Don E. Avery, Patricia A. Kerr, and Allan R. Wieting Apr. 1983 12 p refs Presented at the 18th AIAA Thermophys. Conf., Montreal, 1-3 Jun. 1983

(NASA-TM-84654; NAS 1.15:84654; AIAA-83-1536) Avail: NTIS HC A02/MF A01 CSCL 20D

The heat transfer to simulated shuttle thermal protection system tiles was investigated experimentally using a highly instrumented metallic thin wall tile arranged with other metal tiles in a staggered tile array. Cold-wall heating rate data for laminar and turbulent flow were obtained in the Langley 8-foot high temperature tunnel at a nominal Mach number of 7, a nominal total temperature of 3300 R, free-stream unit Reynolds number from 3.4 x 10 to the 5th power to 2.2 x 10 to the 6th power per foot, and free-stream dynamic pressure of 1.8 psia to 9.1 psia. Experimental data are presented to illustrate the effects of flow angularity and gap width on both local peak heating and overall heating loads. Author

N83-22548# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

TEMPERATURE CALCULATION IN AN INCOMPRESSIBLE PERMANENT LAMINAR FLUID FLOW THROUGH A CIRCULAR PIPE WITH AXIAL CONDUCTION AND VISCOSITY

Jeronimo dosSantosTravelho and Luiz Alberto Vieira Dias Mar. 1983 17 p refs Submitted for publication

(INPE-2662-PRE/273) Avail: NTIS HC A02/MF A01

A solution for the energy equation, with a parabolic velocity profile, for an incompressible permanent laminar fluid flow through a circular pipe, including viscous dissipation and axial conduction is shown. The solution is presented as a series of hypergeometric functions. Furthermore, it is shown how to apply this solution to problems involving first, second and third kind boundary conditions. A first kind boundary condition example is examined, for Peclet numbers from 5 to 100. Author

N83-22549# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ESTIMATING THE ZERO-PLANE DISPLACEMENT FOR TALL VEGETATION USING A MASS CONSERVATION METHOD

L. C. B. Molion and C. J. Moore Mar. 1983 21 p refs Submitted for publication

(INPE-2689-PRE/288) Avail: NTIS HC A02/MF A01

Estimation of the zero-plane displacement derived from experimental windspeed measurements above 18 m pine forest and 8-9 m savannah using a 'mass conservation technique' mentioned by Tajchman is described. The results obtained using this analysis exhibit a lack of sensitivity to experimental errors which is in marked contrast to those commonly obtained over tall vegetation using more conventional least square analyses. The consistency in the results allows an investigation of the windspeed dependence of the aerodynamic properties of the mean horizontal airflow over tall vegetation, and considerations of the effects of experimental errors on such dependence. Author

N83-22550*# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.

THE STRUCTURE OF EVAPORATING AND COMBUSTING SPRAYS: MEASUREMENTS AND PREDICTIONS Semiannual Status Report, 1 Sep. 1981 - 28 Feb. 1982

J.-S. Shuen, A. S. P. Solomon, and G. M. Faeth Mar. 1982 43 p refs

(Grant NAG3-190)

(NASA-CR-170176; NAS 1.26:170176) Avail: NTIS HC A03/MF A01 CSCL 20D

An apparatus was constructed to provide measurements in open sprays with no zones of recirculation, in order to provide well-defined conditions for use in evaluating spray models. Measurements were completed in a gas jet, in order to test experimental methods, and are currently in progress for non-evaporating sprays. A locally homogeneous flow (LHF) model where interphase transport rates are assumed to be infinitely fast; a separated flow (SF) model which allows for finite interphase

transport rates but neglects effects of turbulent fluctuations on drop motion; and a stochastic SF model which considers effects of turbulent fluctuations on drop motion were evaluated using existing data on particle-laden jets. The LHF model generally overestimates rates of particle dispersion while the SF model underestimates dispersion rates. The stochastic SF flow yield satisfactory predictions except at high particle mass loadings where effects of turbulence modulation may have caused the model to overestimate turbulence levels. A.R.H.

N83-22551*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION OF LARGE TURBULENT STRUCTURES WITH THE PARABOLIC NAVIER-STOKES EQUATIONS
J. V. Rakich, R. T. Davis (Cincinnati Univ.), and M. Barnett (Cincinnati Univ.) Jun. 1982 10 p refs Presented at 8th Intern. Conf. on Numerical Methods in Fluid Dyn., Aachen, West Germany, 28 Jun. - 1 Jul. 1982
(NASA-TM-84262; A-8958; NAS 1.15:84262) Avail: NTIS HC A02/MF A01 CSCL 20D

The theoretical basis for well posed marching of a Parabolic Navier-Stokes (PNS) computational technique for supersonic flow is discussed and examples given to verify the analysis. It is demonstrated that stable computations can be made even with very small steps in the marching direction. The method is applied to cones at large angle of attack in high Reynolds number, supersonic flow. Streamline trajectories generated from the numerical solutions demonstrate the development of vortex structures on the lee side of the cone. S.L.

N83-22552# Naval Postgraduate School, Monterey, Calif.
MEASUREMENTS OF THE FLOW FROM A HIGH SPEED COMPRESSOR ROTOR USING A DUAL PROBE DIGITAL SAMPLING (DPDS) TECHNIQUE Interim Report, Oct. 1980 - Sep. 1982
R. Shreeve and F. Neuhoff Sep. 1982 65 p refs
(RR0240301)
(AD-A122432; NPS67-82-010) Avail: NTIS HC A04/MF A01 CSCL 20/4

The flow from a high-speed rotor in a rotor-first arrangement has been measured using a dual-probe, digital sampling (DPDS) technique. The flow field was found to be steady in rotor coordinates (periodic in machine coordinates) outside the rotor wake, and 3 components of velocity and the pressure field were determined in this area. The wake regions were unsteady. In these regions the measurements based on ensemble averages of multiple samples did not follow the behavior established in steady uniform flow except near the wake center. The broadening of the wake and three dimensional effects in the flow field were measured at reduced throttle and increased speeds. The potential for the measurement technique is discussed in some detail. Author (GRA)

N83-22553# Naval Postgraduate School, Monterey, Calif. Dept. of Mechanical Engineering.
EFFECT OF CORE SIZE ON THE RISE AND DEMISE OF TRAILING VORTICES Progress Report, 30 Jun. - 30 Dec. 1982
Turgut Sarpkaya Dec. 1982 110 p refs
(ARPA Order 3925)
(AD-A122556) Avail: NTIS HC A06/MF A01 CSCL 20/4

Experiments were conducted with five lifting surfaces to investigate the evolution of trailing vortices in stratified and unstratified water. The vortex trajectories were determined as a function of the relative depth D/bo, normalized time Vot/bo, stratification parameter Nbo/Vo, and the relative vortex core size ro/bo. The results have shown that the vortices rise only to a finite height as they gradually demise under the influence of turbulence, sinusoidal instability, and the vortex breakdown. The effect of stratification is to reduce the lifespan of vortices and the maximum height attained by them. Various approximate analyses have been examined and new ones have been proposed to determine the lifespan of the trailing vortices. GRA

N83-22554# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THEORETICAL ANALYSIS OF LANGMUIR FLOW EFFECTS IN A RING LASER
Jiang Yanan 6 Dec. 1982 19 p refs Trans. into ENGLISH from Jiguang (Communist China), v. 8, no. 4, 1981 p 1-8
(AD-A122807; FTD-ID(RS)T-1183-82) Avail: NTIS HC A02/MF A01 CSCL 20/4

Gas flow in a gain medium is one of the main sources of error in laser gyros. Shifts in the frequency difference of oppositely directed travelling waves (ODTW) brought about by the flow of active atoms and non-active atoms in the gain medium are quantitatively examined. Theoretical formulas and calculated values are given for Langmuir flows based on third order theory. Statistics are used to deal with shifts in frequency difference for Gaussian beams passing through the gain field and the flow velocity field. Calculation formulas are given for the various cases.Author (GRA)

N83-22555# National Center for Resource Recovery, Washington, D. C.
ELEMENTS OF TROMMEL DYNAMICS: DRAG-FREE CASE, A WORKING PAPER
Marc L. Renard and Gregory V. Clarke Nov. 1982 37 p refs 5 Vol.
(Contract DE-AC03-80CS-24315)
(DE83-003934; DOE/CS-24315/12) Avail: NTIS HC A03/MF A01

The problem of the dynamics of an isolated particle in a trommel under no drag and with an infinitely rough wall, i.e., particle to wall friction coefficient (f/sub w/ (FEMALE) infinity), representing a limit case of infinite dilution of vanishingly small loading, is examined and discussed in detail. The time interval between impingements, progression along the axis during one cycle, number of impingements and residence time in the trommel, and mass flow rate are calculated. Also, presented are relating the number of impingements to the desired screening efficiency and application to design parameters. DOE

N83-22556# National Center for Resource Recovery, Washington, D. C.
ELEMENTS OF TROMMEL DYNAMICS: NOTES ON ELEMENTARY SCREENING PROBABILITY, A WORKING PAPER
Marc L. Renard Nov. 1982 21 p refs 5 Vol.
(Contract DE-AC03-80CS-24315)
(DE83-003839; DOE/CS-24315/13) Avail: NTIS HC A02/MF A01

The approach taken in computing a predicted probability of passage, p, for a single particle impinging on a screen (dilute case) is documented. The way the approach was utilized in sizing particles (model feedstocks, tracers in full scale tests, etc.) so that they give probability of passage upon one single impingement is discussed, and evaluated by comparing the predicted probability with experimental values (or rather range of values) determined during screening efficiency tests. DOE

N83-22557# National Center for Resource Recovery, Washington, D. C.
PILOT-SCALE TROMMEL: EXPERIMENTAL TEST DESCRIPTIONS AND DATA, A WORKING PAPER
Richard Bolczak Nov. 1982 50 p 5 Vol.
(Contract DE-AC03-80CS-24315)
(DE83-003806; DOE/CS-24315/15) Avail: NTIS HC A03/MF A01

Descriptions and summaries are provided of testing on a pilot scale trommel. There are three groupings of results. The first group, feedstock tests, includes descriptions of the feedstocks and results of tests on the probability of passage, the dynamic angle of response, and the coefficient of friction for the test flakes. The second test group on residence time and impingement tests contains data on the movement of flakes and blocks through the trommel. The last group, mass split, screening efficiency and undersize distribution contains data on flake and block mass splits

to the undersize and oversize products and the axial and sectorial distribution in the undersize. DOE

N83-22558# National Center for Resource Recovery, Washington, D. C.
ELEMENTS OF TROMMEL DYNAMICS: DETERMINATION OF THE DYNAMIC BULK DENSITY, A WORKING PAPER
Marc L. Renard Nov. 1982 15 p refs 5 Vol.
(Contract DE-AC03-80CS-24315)
(DE83-003671; DOE/CS-24315/16) Avail: NTIS HC A02/MF A01

The main problem in trommel dynamics is to relate the size and density properties of the feedstock, the geometric and dynamic parameters of the device (rotary screen), the elementary and cumulative probabilities of screening, so as to allow engineering design and/or predictions of operating performances. A procedure is proposed for the determination of the bulk density of the burden in the trommel, under actual dynamical conditions of use. It is obvious that whenever a trommel has to be sized for an actual mass throughput of a given feedstock, the relationship between mass and volume flow rate should be characterized by a bulk density of the material. It is known from experimental observations that the material resting on the barrel between two consecutive phases of flight is generally fluffier than it would be at rest. The problem is to arrive at a determination of the material bulk density as a function of the dynamic and geometric parameters of the device, and of the burden itself. DOE

N83-22559# National Center for Resource Recovery, Washington, D. C.
ELEMENTS OF TROMMEL DYNAMICS: THE EFFECT OF DRAG ON PARTICLE MOTION, A WORKING PAPER
Marc L. Renard and Gregory V. Clarke Nov. 1982 57 p refs 5 Vol.
(Contract DE-AC03-80CS-24315)
(DE83-003937; DOE/CS-24315/17) Avail: NTIS HC A04/MF A01

The problem formation for inplane motion covers the numerical integration of the equations of motion using program FLIGHT, including the ranges of parameters explored, effects of air drag on ballistic phase, and the results from computer runs. In the problem formulation for the three dimensional case, the numerical integration of the equations of motion uses FLD-3 and is applied to the Upper Marlboro trommel. S.L.

N83-22560# Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
USER'S GUIDE TO HEATRAN: A COMPUTER PROGRAM FOR 3-DIMENSIONAL TRANSIENT FLUID-FLOW AND HEAT-TRANSFER ANALYSIS
C. N. C. Wong, S. K. Cheng, and N. E. Todreas Jan. 1982 217 p refs 2 Vol.
(Contract DE-AC02-76ET-37240)
(DE83-003272; DOE/ET-37240/98TR-Pt-1) Avail: NTIS HC A10/MF A01

Input in formation for the HEATRAN user is given. HEATRAN is a computer program which is written to analyze the transient three dimensional single phase incompressible fluid flow and heat transfer problem. The programming information is given first. This information includes details concerning the code and structure. The description of the required input variables is presented next. Following the input description, the sample problems are described and HEATRAN's results are presented. DOE

N83-22561# Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
USER'S GUIDE TO HEATRAN: A COMPUTER PROGRAM FOR 3-DIMENSIONAL TRANSIENT FLUID-FLOW AND HEAT-TRANSFER ANALYSES
C. N. C. Wong, S. K. Cheng, and N. E. Todreas Jan. 1982 224 p 2 Vol.
(Contract DE-AC02-76ET-37240)
(DE83-003273; DOE/ET-37240/98TR-Pt-2) Avail: NTIS HC A10/MF A01

A 3-D distributed parameter code, HEATRAN, was developed to calculate detailed velocity and temperature fields in the coolant and cladding temperature distribution in a wire-wrapped rod assembly. The code structure is discussed and the input description is presented. The program listings and sample problems of HEATRAN's several versions are included. DOE

N83-22562# Sandia Labs., Albuquerque, N. Mex. Fluid Mechanics and Heat Transfer Div.
MARIAH: A FINITE-ELEMENT COMPUTER PROGRAM FOR INCOMPRESSIBLE POROUS FLOW PROBLEMS. THEORETICAL BACKGROUND
David K. Gartling and Charles E. Hickox Oct. 1982 51 p refs
(Contract DE-AC04-76DP-00789)
(DE83-002628; SAND-79-1622) Avail: NTIS HC A04/MF A01

The theoretical background for the finite element computer program MARIAH is presented. The MARIAH code is designed for the analysis of incompressible fluid flow and heat transfer in saturated porous media. A description of the fluid/thermal boundary value problem treated by the program is presented and the finite element method and associated numerical methods used in MARIAH are discussed. Instructions for use of the program are documented in the Sandia National Labortories report, SAND79-1623. DOE

N83-22563# Argonne National Lab., Ill. Reactor Analysis and Safety Div.
CRITICAL HEAT-FLUX EXPERIMENTS UNDER LOW-FLOW CONDITIONS IN A VERTICAL ANNULUS
K. Mishima and M. Ishii Mar. 1982 44 p refs
(Contract W-31-109-eng-38)
(DE82-009965; NUREG/CR-2647; ANL-82-6; NRC-FIN-A2026)
Avail: NTIS HC A03/MF A01

An experimental study was performed on critical heat flux (CHF) at low flow conditions for low pressure steam water upward flow in an annulus. The test section was transparent, therefore, visual observations of dryout as well as various instrumentations were made. The data indicated that a premature CHF occurred due to flow regime transition from churn turbulent to annular flow. It is shown that the critical heat flux observed in the experiment is essentially similar to a flooding limited burnout and the critical heat flux can be well reproduced by a nondimensional correlation derived from the previously obtained criterion for flow regime transition. The observed CHF values are much smaller than the standard high quality CHF criteria at low flow, corresponding to the annular flow film dryout. This result is very significant, because the coolability of a heater surface at low flow rates can be drastically reduced by the occurrence of this mode of CHF. DOE

N83-22564# Oak Ridge National Lab., Tenn. Energy Div.
SIMULTANEOUS HEAT AND MASS TRANSFER IN ABSORPTION/DESORPTION OF GASES IN LAMINAR LIQUID FILMS
Gershon Grossman 1982 43 p refs Presented at the AICHE 1982 Natl. Winter Meeting, Orlando, Fla., 28 Feb. - 3 Mar. 1982
(Contract W-7405-eng-26)
(DE82-008812; CONF-820202-15) Avail: NTIS HC A03/MF A01

A theoretical analysis of the combined heat and mass transfer process taking place in the absorption (or desorption) of a gas or vapor into (or from) a laminar liquid film was described. While this type of process occurs in many gas-liquid systems, the amount of heat released is often small, which makes the process practically isothermal. In some cases, however, the heat of absorption/desorption is significant and temperature variations cannot be ignored. One example, from which the present study originated, is in absorption heat pumps where mass transfer is produced specifically to generate a temperature change. The model analyzed in this study describes a liquid film flowing over an inclined plane, with its free surface in contact with stagnant vapor. The absorption/desorption process at the surface creates non-uniform temperature and concentration profiles in the film, which develop until equilibrium between the liquid and vapor is achieved. B.G.

N83-22565# Pacific Northwest Lab., Richland, Wash.
OFF-GAS CHARACTERISTICS OF LIQUID-FED JOULE-HEATED CERAMIC MELTERS
R. W. Goles and G. J. Sevigny Jun. 1982 30 p refs Presented at the 17th DOE Nucl. Air Cleaning Conf., Denver, 2-5 Aug. 1982
(Contracts DE-AC06-76RL-01830; DE-TDO-954(AR-05-15-10))
(DE83-002072; PNL-SA-10290; CONF-820833-15) Avail: NTIS HC A03/MF A01

The off gas characteristics of liquid fed joule heated ceramic meters were investigated as a function of melter operational condition and simulated waste feed composition. The identity and behavior patterns of gaseous emissions, the characteristics of melter generated aerosols, the nature and magnitude of melter effluent losses and the factors affecting melter operational performance were established. DOE

N83-22566# Brookhaven National Lab., Upton, N. Y. Dept. of Mechanical Engineering.
VERTICAL-CHANNEL FREE CONVECTION WITH A POWER-LAW FLUID
Thomas F. Irvine, Jr. (State Univ. of New York at Stony Brook), K. C. Wu, and William J. Schneider 1982 7 p refs Presented at the ASME Winter Ann. Meeting, Phoenix, Ariz., 14 Nov. 1982
(Contract DE-AC02-76CH-00016)
(DE82-019979; BNL-31640; CONF-821101-8) Avail: NTIS HC A02/MF A01

A finite difference solution is presented of the velocity and temperature fields for the flow of an Ostwald-de-Waele (power law) fluid between two vertical isothermal parallel plates under the influence of free convection. Two quantities are of particular interest: the total heat transferred from the plates and the average velocity between the plates. Although these quantities can be presented in a dimensionless manner as related to the generalized Grashof and Prandtl numbers, there is an important difference compared to the similar problem involving Newtonian fluids. In the present case, the generalized Prandtl number is not a fluid property but contains a geometric factor and thus the geometry of the system must be specified before the Prandtl number is fixed. The results and the manner in which they can be used as illustrated by a numerical example. DOE

N83-22567# Hahn-Jackson-Thresher-Henning, Inc., Evansville, Ind.
SOLAR-ASSISTED WATER-SOURCE HEAT PUMP
31 Mar. 1982 4 p
(Contract DE-FG02-81R5-10298)
(DE82-013981; DOE/R5-10298/1) Avail: NTIS HC A02/MF A01

The usefulness of a collector array is to be extended to year-round usage by using the collectors to reject heat at night during the summer. A water source heat pump is used to cool a home by rejecting heat to water which is then held in a storage tank. At night the warm water is pumped through the collectors for radiative cooling. Two complete systems are being installed to demonstrate feasibility. One part of the system has been completed and tested. DOE

N83-22568# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
BOUNDARY-LAYER CONTROL BY MEANS OF STRONG INJECTION Thesis
Ruey-Jen Yang Feb. 1982 63 p refs
(Contract DE-AC03-76SF-00098)
(DE82-012547; LBL-13807) Avail: NTIS HC A04/MF A01

The gas mixture produced by a coal gasifier contains components which have serious corrosive effects on the walls of the pipe flow system. To reduce these, a noncorrosive gas is injected into the stream of the coal gas products, in a direct parallel to the pipe wall. The interaction between the injected stream and the original pipe flow is investigated analytically and is an example of the so-called Wall Jet Problem. The model adopted is that of a two-dimensional incompressible turbulent free mixing layer, with the corrosive gas H2S forming the upper stream and moving faster than the injected non-corrosive gas in the lower stream, the latter bounded by the solid wall of the pipe. This wall jet flow can be divided into three distinct regions. DOE

N83-22569# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Chemistry.
VIBRATIONAL LINEWIDTH-BROADENING MECHANISMS IN LIQUIDS REVEALED BY THE SEPARATION OF THE RAPIDLY AND SLOWLY VARYING INTERMOLECULAR FORCES
S. M. George, A. L. Harris, M. Berg, and C. B. Harris Mar. 1982 33 p refs
(Contract DE-AC03-76SF-00098)
(DE82-013530; LBL-13781) Avail: NTIS HC A03/MF A01

The mechanisms for vibrational linewidth broadening in liquids are investigated using the temperature dependence of coherent picosecond Stokes scattering. Both rapidly varying repulsive and slowly varying attractive intermolecular forces are determined to cause significant linewidth broadening. The liquid's local number density distribution width is shown to play an important role in inhomogeneous linewidth broadening. This is in agreement with both the model of George, Auweter and Harris and the recent theory by Schweizer and Chandler. DOE

N83-22570# California Univ., Livermore. Lawrence Livermore Lab.
MODELING OF CURRENT AND THERMAL MODE SECOND BREAKDOWN PHENOMENA
J. H. Yee, W. J. Orvis, L. C. Martin, and J. C. Peterson 13 Sep. 1982 7 p refs Presented to the 4th Ann. Elec. Overstress/Electrostatic Discharge Symp., Orlando, Fla., 21-23 Sep. 1982
(Contract W-7405-eng-48)
(DE82-020965; UCRL-87400; CONF-820946-1) Avail: NTIS HC A02/MF A01

A computer code which solves the transport equations for electrons and holes in conjunction with the heat transfer equation, to investigate current mode and thermal second breakdown (CSB and TSB) was used. For an epitaxial transistor, we have calculated the average failure threshold power and the average failure threshold energy, as a function of the delay time to failure for different external reistances. We show that, because of the existence of two types of breakdown phenomena, the threshold power and threshold energy curves are not a continuous function of the delay times. We have calculated the evolution of the electric fields and the densities of holes and electrons as a function of space and time during current mode second breakdown. And, we have investigated the temporal behavior of the temperature during second breakdown. Finally, we present some preliminary experimental results concerning the threshold power for breakdown. DOE

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N83-22571*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EDDY CURRENT X-Y SCANNER SYSTEM
George W. Kurtz Feb. 1983 48 p refs
(NASA-TM-82513; NAS 1.15:82513) Avail: NTIS HC A03/MF A01 CSCL 14B

The Nondestructive Evaluation Branch of the Materials and Processes Laboratory became aware of a need for a miniature, portable X-Y scanner capable of performing eddy current or other nondestructive testing scanning operations such as ultrasonic, or small areas of flat plate. The technical description and operational theory of the X-Y scanner system designed and built to fulfill this

need are covered. The scanner was given limited testing and performs according to its design intent, which is to scan flat plate areas of approximately 412 sq cm (64 sq in) during each complete cycle of scanning. Author

N83-22572# Monsanto Research Corp., Miamisburg, Ohio. Mound Facility.
CALIBRATION TECHNIQUES COMPARED FOR A GAS MEASURING SYSTEM
Terrence L. Buxton, Ray W. Baker, Philip D. Bantz, Ronald E. Sprague, Evelyn V. Swartz, Stewart W. Trefzger, and Howard A. Woltermann 30 Nov. 1982 12 p refs
(Contract DE-AC04-76DP-00053)
(DE83-004291; MLM-2933) Avail: NTIS HC A02/MF A01

A comparison was made of two individual techniques for providing calibration, for a gas measureing system. Advantages and disadvantages of the individual techniques are discussed. The techniques applied are: certification of individual components, transfer of weighed quantities of xenon gas, and comparison of the calorimetrically determined quantity of tritium to the amount determined by the gas measuring system. Both of these techniques gave excellent agreement. DOE

N83-22573# Bendix Corp., Kansas City, Mo.
EVALUATION OF COORDINATE MEASURING MACHINES
R. J. Russell Nov. 1982 26 p refs
(Contract DE-AC04-76DP-00613)
(DE83-004098; BDX-613-2854) Avail: NTIS HC A03/MF A01

Positional accuracy, thermal distortion, and load distortion of the coordinate measuring machine (CMM) are among the most important factors contributing to the final accuracy of the inspected tool or gage. The positional accuracy of the CMM is addressed and a method to evaluate the volumetric accuracy of a bridge design CMM work zone (the volumetric space that houses inspection points on a part to be inspected is described. DOE

N83-22574# Bendix Corp., Kansas City, Mo.
WALL-THICKNESS MASTERING OF COMPUTER-ASSISTED GAGES Final Report
R. E. Hines Jun. 1982 31 p refs
(Contract DE-AC04-76DP-00613)
(DE82-016994; BDX-613-2779) Avail: NTIS HC A03/MF A01

An alternate method of gage mastering (set up) and a device to verify the accuracy of wall thickness measurements were developed. These are used with computer-assisted gages that measure the contour and wall thickness of metal or plastic parts. A computer program was created to allow a gage to be mastered with a gage master certified directly in wall thickness instead of inner and outer contour as was done previously. This method limits the error possibility to the uncertainty of the master's wall thickness rather than its contours. A universal wall thickness verifier device was designed and used with a gage to resolve a discrepancy between two different certifications of the same master. DOE

N83-22575# Office of Radiation Programs, Las Vegas, Nev.
RADIOFREQUENCY MEASUREMENTS WORKSHOP Summary Report
Richard A. Tell Jul. 1982 18 p refs Workshop held at Las Vegas, Nev., 3-5 Nov. 1980
(PB83-1154288; EPA-520/2-82-010) Avail: NTIS HC A02/MF A01 CSCL 14B

Experiences with the use, application, design, and limitations of available instrumentation for assessing potentially hazardous electromagnetic fields are discussed. Field and laboratory tests were conducted in order to compare differing instruments and measurement techniques under identical field and test conditions. Emphasis was placed on broadband survey types of instruments as opposed to more sophisticated, narrowband measuring equipment. GRA

N83-22576# National Bureau of Standards, Washington, D.C. National Measurements Lab.
STANDARD REFERENCE MATERIALS: A STANDARD REFERENCE MATERIAL CONTAINING NOMINALLY FIVE PERCENT AUSTENITE (SRM 485A) Final Special Publication
G. E. Hicho and E. E. Eaton Aug. 1982 28 p refs
(PB83-115568; NBS-SP-260-76; LC-82-600574) Avail: NTIS HC A03/MF A01 CSCL 14B

This Standard Reference Material, SRC 485a, is a renewal of SRM 485, and is intended for the calibration of X-ray diffraction equipment used in determining the amount of retained austenite in hardened steels. Compacts were produced and subsequently examined for nickel content by X-ray fluorescence spectrometry. A calibration curve was established using 13 compacts randomly selected from a population of 216. The curve relates the weight percent nickel from X-ray fluorescence measurements to the volume percentage austenite as determined by quantitative microscopy measurements of area percent. The curve was then used to assign the certified values to the remaining compacts. This SRM may be used as an X-ray diffraction standard for retained austenite or in very special cases as an X-ray fluorescence standard for nickel content. GRA

N83-22577# National Bureau of Standards, Washington, D.C. National Measurement Lab.
STANDARD REFERENCE MATERIALS: A STANDARD REFERENCE MATERIAL CONTAINING NOMINALLY THIRTY PERCENT AUSTENITE (SRM 487) Final Special Publication
G. E. Hicho and E. E. Eaton Sep. 1982 28 p refs
(PB83-115576; NBS-SP-260-78; LC-82-600587) Avail: NTIS HC A03/MF A01 CSCL 14B

This Standard Reference Material, SRM 487, is intended for the calibration of X-ray diffraction equipment used in determining the amount of retained austenite in hardened steels. Compacts were produced and subsequently examined for nickel content by X-ray fluorescence spectrometry. A calibration curve was established using 19 compacts randomly selected from the population of 233. The curve relates the weight percent nickel from X-ray fluorescence measurements to the volume percentage austenite as determined by quantitative microscopy measurements of area percent. The curve was then used to assign the certified values to the remaining compacts. This SRM may be used as an X-ray diffraction standard for retained austenite or in very special cases as an X-ray fluorescence standard for nickel content. GRA

N83-22578*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
DEVELOPMENT OF A PRIEST INTERFEROMETER FOR MEASUREMENT OF THE THERMAL EXPANSION OF A GRAPHITE EPOXY IN THE TEMPERATURE RANGE 116-366 K
John S. Short, Michael W. Hyer, David E. Bowles, and Stephen S. Tompkins Sep. 1982 137 p refs
(Contract NCC1-15)
(NASA-TM-85176; NAS 1.15:85176; PB83-116640; VPI-E-82-18) Avail: NTIS HC A07/MF A01 CSCL 14B

The thermal expansion behavior of graphite epoxy laminates between 116 and 366 degrees Kelvin was investigated using as implementation of the Priest interferometer concept. The design, construction and use of the interferometer along with the experimental results it was used to generate are described. The experimental program consisted of 25 tests on 25.4 mm and 6.35 mm wide, 8 ply pi/4 quasi-isotropic T300-5208 graphite/epoxy specimens and 3 tests on a 25.4 mm wide unidirectional specimen. Experimental results are presented for all tests along with a discussion of the interferometer's limitations and some possible improvements in its design. GRA

N83-22579# Bionetics Corp., Hampton, Va.
DEVELOPMENT OF A CHARGED GRID SENSOR FOR AIRBORNE CARBON FIBERS Final Report, 1 Jul. 1980 - 30 Sep. 1981
S. Salmirs, J. Schrader, and A. Butterfield Oct. 1982 54 p refs
(Contract EPA-68-02-3272)
(PB83-116848; EPA-600/3-82-086) Avail: NTIS HC A04/MF A01 CSCL 14B

This development addressed the sensing and measurement

of carbon fibers moving in ventilating ducts or the exhaust stacks of incinerators. The sensor system utilizes a series of 5 electrically charged grids with different grid spacings to sense the fibers, make determinations of their length, and present a count of the numbers detected. The system will sense carbon fibers shorter than 0.1 mm moving at velocities from 2 to 4 meters per second. In addition, the system will measure fiber populations up to 100 fibers/cu meter in each of 5 lengths ranging from 0.1 to 1.5 mm. The areas which require further development have been identified together with a list of design requirements and alternate materials or fabrication techniques applicable to producing a unit for evaluation in a field test. GRA

N83-22580# National Bureau of Standards, Washington, D.C. National Measurements Lab.
STANDARD REFERENCE MATERIALS: APPLICATION OF SOME METAL SRM'S AS THERMOMETRIC FIXED POINTS Final Special Publication
George T. Furukawa, John L. Riddle, William R. Bigge, and Earl R. Pfeiffer Aug. 1982 144 p refs
(PB83-117325; NBS-SP-260-77; LC-82-600578) Avail: NTIS HC A07/MF A01 CSCL 14B

Equipment and procedures are described for the realization of liquid-solid phase equilibrium states of some pure metals as thermometric fixed points for platinum resistance thermometry. The design and techniques for assembling fixed point cells using Standard Reference Materials (SRM) 740 (zinc), 43h (zinc), 42g (tin), 741 (tin), 44f (aluminum), 746 (cadmium), and 743 (mercury) are given and the results of the measurements using the purer of these metal SRM's are analyzed and evaluated. The reproducibility of temperature measurements with these metal SRM's is shown to be about plus or minus 0.1 mK. GRA

N83-22581# Bureau of Mines, Denver, Colo. Intermountain Field Operations Center.
PRELIMINARY TESTING OF A PROTOTYPE PORTABLE X-RAY FLUORESCENCE SPECTROMETER
Lowell L. Patten, Neal B. Anderson, and John J. Stevenson Aug. 1982 39 p refs
(NASA-TM-85298; NAS 1.15:85298; PB83-112557; BM-IC-8888; LC-82-600159) Avail: NTIS HC A03/MF A01 CSCL 14B

A portable X-ray fluorescence spectrometer for use as an analyzer in mineral resource investigative work was built and tested. The prototype battery powered spectrometer, measuring 11 by 12 by 5 inches and weighing only about 15 pounds, was designed specifically for field use. The spectrometer has two gas proportional counters and two radioactive sources, Cd (10a) and Fe (55). Preliminary field and laboratory tests on rock specimens and rock pulps have demonstrated the capability of the spectrometer to detect 33 elements to date. Characteristics of the system present some limitations, however, and further improvements are recommended. GRA

N83-22301*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
NEUTRAL GAS MASS SPECTROMETER ON THE IECM
G. R. Carignan *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 8 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N83-22582*# Stanford Univ., Calif. Lab. of Physics.
STUDIES ON LASERS AND LASER DEVICES Final Report, 1 Apr. 1980 - 31 Mar. 1983
S. E. Harris, A. E. Siegman, and J. F. Young Apr. 1983 81 p refs
(Grant NAG2-44)
(NASA-CR-170173; NAS 1.26:170173; GL-3564) Avail: NTIS HC A05/MF A01 CSCL 20E

The goal of this grant was to study lasers, laser devices, and uses of lasers for investigating physical phenomena are studied. The active projects included the development of a tunable, narrowband XUV light source and its application to the spectroscopy of core excited atomic states, and the development of a technique for picosecond time resolution spectroscopy of fast photophysical processes. S.L.

N83-22583*# EG & G Washington Analytical Services Center, Inc., Riverdale, Md.
STUDIES OF ATMOSPHERIC REFRACTION EFFECTS ON LASER DATA Final Report
Peter J. Dunn, William A. Pearce, and Thomas S. Johnson (NASA. Goddard Space Flight Center, Greenbelt, Md.) Jun. 1982 57 p refs
(Contract NAS5-25884)
(NASA-CR-170503; NAS 1.26:170503) Avail: NTIS HC A04/MF A01 CSCL 20E

The refraction effect from three perspectives was considered. An analysis of the axioms on which the accepted correction algorithms were based was the first priority. The integrity of the meteorological measurements on which the correction model is based was also considered and a large quantity of laser observations was processed in an effort to detect any serious anomalies in them. The effect of refraction errors on geodetic parameters estimated from laser data using the most recent analysis procedures was the focus of the third element of study. The results concentrate on refraction errors which were found to be critical in the eventual use of the data for measurements of crustal dynamics. S.L.

N83-22584# Naval Research Lab., Washington, D. C.
STABILITY AND SYMMETRY IN INERTIAL CONFINEMENT FUSION
M. H. Emery, S. E. Bodner, J. P. Boris, D. G. Colombant, and A. L. Cooper 9 Dec. 1982 18 p refs
(AD-A122421; NRL-MR-4947) Avail: NTIS HC A02/MF A01 CSCL 20/5

The asymmetries of spherical implosions driven by direct laser illuminations are of fundamental concern to the inertial confinement fusion community because they provide severe limitations on high gain pellet designs. Theoretical progress on several fronts has recently been made through numerical simulations in providing a more complete understanding of the physical processes involved in these asymmetries and instabilities. The results also suggest methods of controlling these processes and their implications for laser fusion systems design. Stability and symmetry issues have been investigated. Laser matter coupling and scaling laws relating the asymmetry results to spherical pellet designs have been investigated. Principle results include finding (1) the requirements for thermal smoothing of laser nonuniformities, (2) reduced Rayleigh-Taylor growth rates and saturation via the nonlinear Kelvin-Helmholtz roll-up, (3) that perturbation wavelengths greater than the shell thicknesses are most likely to cause an asymmetric implosion, (4) a new theory based on vortex shedding that explains the reduced linear Rayleigh-Taylor growth rates and (5) a possible wavelength-intensity window for direct illumination where the requirements of pellet velocity, symmetry, and efficiency necessary for high gain can be simultaneously met. GRA

N83-22585# Army Missile Command, Redstone Arsenal, Ala. Directed Energy Diectorate.
CUMULATIVE REACTANT SPECIES INDEX FOR VOLUMES 1-8 OF THE COMPILATION OF DATA RELEVANT TO GAS LASERS, VOLUME 9
E. W. McDaniel, S. T. Manson, J. W. Gallagher, J. R. Rumble, and E. C. Beaty Sep. 1982 165 p
(AD-A122391; DRSMI/RH-82-1-TR-Vol-9) Avail: NTIS HC A08/MF A01 CSCL 20/5

This volume contains a cumulative reactant species index for MIRADCOM Technical Report H-78-1. Volumes I and II covered data relevant to rare gas and gasmonohalide excimer lasers;

Volumes III - VI covered data relevant to nuclear pumped lasers; and Volumes VII - VIII covered additional data relevant to gas lasers. Author (GRA)

N83-22586# Block Engineering, Inc., Cambridge, Mass.
LASER REPAIR AND LONG TERM TECHNICAL SUPPORT Final Report
22 Oct. 1982 9 p
(Contract DAAK20-79-C-0026)
(AD-A122380; BE-82-963) Avail: NTIS HC A02/MF A01 CSCL 20/5

In an effort to support the needs of the Korean Government, the Army directed Block Engineering to: Repair or replace the two lasers, verify their operation and return then to Korea; Send an engineer to Korea to make some minor modifications to the system and to provide additional, on-site training to ADP personnel; Provide subsequent consulting support, by mail or telephone as appropriate following the field effort; and Provide a brief final report. (This report). Author (GRA)

N83-22587# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Electro-Optics.
DESIGNING WAVEGUIDE COUPLERS FOR MICROWAVE EXCITATION OF LASER GASES M.S. Thesis
Leonard C. Shelton, Jr. 1982 151 p refs
(AD-A124666; AFIT/GEO/PH/82D-13) Avail: NTIS HC A08/MF A01 CSCL 20/5

The goal here is to develop an analytical model from which a waveguide coupler can be designed. The specific application considered is to use a waveguide coupler to excite a plasma tube inside a wavegide. This application is desirable for use in laser systems. The approach taken is to model the plasma as an equivalent dielectric centered in the secondary waveguide. Standard waveguide analysis techniques are used to find a perturbed propagation constant in what waveguide. Successive approximations are made to the coupled wave equations until a piece-wise linear solution is obtained. This solution gives the field distribution resulting from any arbitrarily chosen coupling geometry. Thus, the distribution for any desired coupling characteristics can be determined in an iterative manner, essentially by trial and error. Preliminary tests were made on couplers designed using the model; initial results are promising but inconclusive. Author

N83-22588# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Physics.
SURFACE ANALYSIS OF POLISHED FUSED-SILICA LASER LENSES BY ION-SCATTERING SPECTROMETRY
K. Orvek and S. A. Steward (California Univ., Lawrence Livermore Lab.) Livermore, Calif. California Univ., Lawrence Livermore Lab. 11 Oct. 1982 17 p
(Contract W-7405-eng-48)
(DE83-003843; UCID-19578) Avail: NTIS HC A02/MF A01

New advances in high powered glass lasers, particularly the NOVA system, have resulted in a need for lenses having higher damage threshold values than those now available. It is currently thought that surface contaminants on the lenses are responsible for initiating part of the damage. These contaminants are apparently introduced during the final polishing stages. Ion scattering spectrometr (ISS) was used to identify contaminants arising through he use of different polishing techniques. Five lenses were studied, each having undergone different polishing procedures. The first lens was not polished after receiving it from the manufacturer. Ion microprobe data were available for this lens, and they were compared to ISS results. The second lens was polished with rouge. The third lens was studied as received from the manufacturer. The final two lenses had both been polished using high-purity ceria, cerium oxide. B.G.

N83-22589# Sandia Labs., Livermore, Calif.
TIME-INTEGRATED IMAGES OF LINEAR STRIATED FILAMENTARY LASER SPARKS
Robert W. Schmieder Mar. 1982 49 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012518; SAND-81-8714) Avail: NTIS HC A03/MF A01

The dependence of time integrated photographic and linear diode array images of linear striated filamentary laser sparks on gas pressure and laser energy is described. For sparks in air, it was found that the pressure regime 100 to 300 Torr produces images of minimum diameter (about 150 microns) and maximum sharpness. Diode array images exhibit longitudinal and transverse luminosity profiles which differ from photographic images due to different spectral sensitivities. These data are of value in using the linear laser spark as an imaging probe of inhomogeneous gases such as turbulent reacting flows and diffusion flames. DOE

N83-22590# Los Alamos Scientific Lab., N. Mex.
TWO-DIMENSIONAL MODELING OF MULTIPLY SCATTERED LASER RADIATION IN OPTICALLY DENSE AEROSOLS
A. Zardecki, S. A. W. Gerstl, and J. F. Embury (Aberdeen Proving Ground, Md.) 1982 14 p refs Presented at the CSL Conf. on Obscuration and Aerosol Res., Aberdeen Proving Ground, Md., 21-25 Jun. 1982
(Contract W-7405-eng-36)
(DE83-000607; LA-UR-82-2791; CONF-8206121-1) Avail: NTIS HC A02/MF A01

The discrete ordinates finite element radiation transport code TWOTRAN is applied to describe the multiple scattering of a laser beam from a reflecting target. For a model scenario involving a 99% relative humidity rural aerosol, we compute the average intensity of the scattered radiation and correction factors to the Lambert-Beer law arising from multiple scattering. As our results indicate, two dimensional x-y and r-z geometry modeling can reliably describe a realistic three dimensional scenario. Specific results are presented for the two visual ranges of 1.52 and 0.76 km which show that for sufficiently high aerosol concentrations (e.g., equivalent to V = 0.76 km) the target signature in a distant detector becomes dominated by multiply scattered radiation from interactions of the laser light with the aerosol environment. DOE

N83-22591# National Bureau of Standards, Boulder, Colo. Electromagnetic Technology Div.
DOCUMENTATION OF THE NBS C, K, AND Q LASER CALIBRATION SYSTEMS
William E. Case Sep. 1982 74 p refs
(PB83-125633; NBSIR-82-1676) Avail: NTIS HC A04/MF A01 CSCL 20E

A complete guide for the documentation of the NBS laser power and energy calibration systems is provided. A detailed procedure for operating the three (C, K, and Q) calibration systems under computer control is also described. GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N83-22592*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LUBRICATION BACKGROUND
Bernard J. Hamrock and Duncan Dowson (Leeds Univ., England) Sep. 1981 70 p refs Submitted for publication
(NASA-TM-81692; E-209; NAS 1.15:81692) Avail: NTIS HC A04/MF A01 CSCL 11H

Surface topography, including the various physical methods of measuring surfaces, and the various lubrication regimes (hydrodynamic, elastohydrodynamic, boundary, and mixed) are discussed. The historical development of elastohydrodynamic lubrication is outlined. S.L.

N83-22593# Federal Aviation Administration, Atlantic City, N.J. Technical Center
BRAKING OF AN AIRCRAFT TIRE ON GROOVED AND POROUS ASPHALTIC CONCRETE Final Report
Satish K. Agrawal Jan. 1983 37 p refs
(FAA Proj. 082-531-500)

(FAA-CT-82-147; FAA-RD-82-77) Avail: NTIS HC A03/MF A01

An experimental program that investigated the braking and hydroplaning performance of an aircraft tire on asphaltic concrete surfaces having various treatments is described. The tests were conducted on a dynamic track in the speed range of 70 to 150 knots, and under other operating conditions whose magnitudes represented values widely used by airlines or aircraft. The results show that the type of surface treatment has a significant influence on the braking performance of an aircraft tire on 'puddled' runways, grooves at closure spacings provide higher friction levels. When the runways are 'wet' or 'flooded' the braking capability on all surfaces is either very high or very low, respectively. The braking performance on the reflex percussive grooves, the porous friction overlay, and the saw cut grooves spaced at 3 inches is comparable. S.L.

N83-22594# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

IGNITION TECHNIQUE FOR CONVENTIONAL MOTORS BY HIGH ENERGY SPARK M.S. Thesis - Aug. 1982 [TECNICA DE IGNICAO EM MOTORES CONVENCIONAIS POR CENTELHA DE ALTA ENERGIA]

Heraldo da Silva Couto Feb. 1983 66 p refs In PORTUGUESE; ENGLISH summary

(INPE-2645-TDL/116) Avail: NTIS HC A04/MF A01

The design, construction, use and testing of a capacitive constant high energy output electronic ignition which is associated with variable gap spark plugs is discussed. Its use was studied in a VW 1500 engine and results are presented in graphs of power vs air fuel ratio. The advantages over the conventional system for lean mixture limit extension, the improvement of fuel burning conditions and the satisfactory burning of low grade fuels are discussed. E.A.K.

N83-22595# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.

FIBER COMPOSITE RETAINING RINGS FOR TURBINE-DRIVEN GENERATORS. VOLUME 1: MATERIAL DEVELOPMENT Final Report

W. A. Logsdon, R. H. Marloff, and D. S. Kim Oct. 1982 192 p refs Sponsored by EPRI 4 Vol.

(EPRI Proj. 1474-1)

(DE83-900555; EPRI-EL-2674-Vol-1) Avail: NTIS HC A09/MF A01

Composite design data, construction techniques and methods of attachment that support the application of graphite epoxy composites for electrical generator retaining rings were developed. The approach to the design of an optimum graphite epoxy composite retaining ring involved a combined finite element analysis and material testing effort. The initial phase of this program dealt exclusively with development of the conventional strength of materials parameters under loading conditions representative of intended service requirements as well as special considerations related to the development of rational strength and fracture criteria for composites. Notched body, cracked body and combined mode loading considerations were addressed. The role of nondestructive testing in the characterizing of composite structure quality and overall structural integrity considerations was also included. Results from the vast number and variety of tests conducted combined to support the application of graphite epoxy composites for electrical generator retaining rings. DOE

N83-22596# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.

FIBER COMPOSITE RETAINING RINGS FOR TURBINE-DRIVEN GENERATORS. VOLUME 2: COMPOSITE RETAINING RING FABRICATION STUDIES Final Report

R. L. Kolek Oct. 1982 145 p refs Sponsored by EPRI 4 Vol.

(EPRI Proj. 1474-1)

(DE83-900556; EPRI-EL-2674-Vol-2) Avail: NTIS HC A07/MF A01

The activities leading to the successful fabrication of thick wall graphite fiber reinforced spin test rings are described. These spin test rings were designed and produced in order to define construction, material and manufacturing concepts necessary for the application of composite retaining rings to full size generator rotors. Baseline composite material and prototype ring test data were established. This led to the selection of the AS-4/3501-6 (Graphite Fiber/Epoxy) material for spin test ring fabrication. Manufacturing and cost analysis studies identified a method for fabricating these rings. This method, the Bias Ply Winding Process, resulted in high quality rings meeting all specification and spin test requirements. Physical property and friction coefficient data were collected on the spin test rings. This information was used to clarify the retaining ring attachment concepts defined in this program. DOE

N83-22597# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.

FIBER COMPOSITE RETAINING RINGS FOR TURBINE-DRIVEN GENERATORS. VOLUME 3: FIBER COMPOSITE RING DESIGN AND TESTING Final Report

L. L. Ross, G. Mott, C. Visser, and J. A. Gribic Oct. 1982 138 p refs Sponsored by EPRI 4 Vol.

(EPRI Proj. 1474-1)

(DE83-900557; EPRI-EL-2674-Vol-3) Avail: NTIS HC A07/MF A01

Two 0.65 scale model composite retaining rings were subjected to 3000 speed (stress) cycles at 800 C. This test was meant to simulate the many start/stops that an actual retaining ring would experience in the 30 to 40 year life of a large turbine-generator. Finite element computer analyses were performed to determine the stress distributions in full size steel and composite retaining rings and in the scale model test rings. Results of the analyses were compared with the failure criteria. It was correctly predicted that the model rings would withstand the speed cycles. An overstress test was also performed on one of the model rings, subjecting the ring to 2.8 times the stress that would exist at normal operating conditions. Ultrasonic and fluorescent dye penetrant tests were done several times on each ring to determine their conditions before and after the tests. DOE

N83-22598# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.

FIBER COMPOSITE RETAINING RINGS FOR TURBINE-DRIVEN GENERATORS. VOLUME 4: ATTACHMENT AND ELECTRICAL FLOW CONSIDERATIONS Final Report

R. L. Murphy, E. Aivaliotis, and L. J. Long Oct. 1982 222 p refs Sponsored by EPRI 4 Vol.

(EPRI Proj. 1474-1)

(DE83-900521; EPRI-EL-2674-Vol-4) Avail: NTIS HC A10/MF A01

There are two material properties of the graphite composite that present the designer with challenges. First, the electrical resistance is very high which means an additional shorting ring will be required to provide the end connection for the damper circuit. Second, the coefficient of thermal expansion is near zero which means the ususal method of heating the retaining ring to shrink fit it on the rotor will no longer work. All retaining ring requirements that must be met are described, and several design concepts are analyzed. The design matrix tool was used to pick the best of three possible alternatives. The metal shield design was clearly the best alternative; however, considerable analysis, material testing, and prototype testing remain to be done before such a ring be used on a real machine. DOE

N83-22599# Sandia Corp., Livermore, Calif. Materials Science Div.

THERMAL FATIGUE TESTS OF SOLAR ONE RECEIVER-TUBE WELDMENTS

Darcy A. Hughes Mar. 1982 33 p refs

(Contract DE-AC04-76DP-00789)

(DE82-012520; SAND-82-8206) Avail: NTIS HC A03/MF A01

Tubing for solar receiver panels is joined by longitudinal welds using a low heat input welding process. Concern existed that lack of fusion defects (crack-like notches at the root of the weld) created

by this welding process would propagate during diurnal thermal cycling. If crack propagation occurred at these defects, it could shorten the life of the receiver tube panels. An experiment which simulated key elements of the receiver cyclic thermal strain environment was designed to address this concern. During the experiment, receiver tube weldments (welds prepared, in the laboratory) were thermally cycled for 15,000 cycles. They were subsequently examined metallographically for crack propagation. Results of this examination revealed that no crack propagation occurred during the test. DOE

N83-22600# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
BASIC STUDY OF HEAT FLOW IN FUSION WELDING Progress Report
J. Szekely and T. W. Eagar 15 Oct. 1982 135 p refs
(Contract DE-AC02-78ER-04799)
(DE83-002803; DOE/ER-04799/4) Avail: NTIS HC A07/MF A01

The development of an improved fundamental understanding of heat flow and fluid flow phenomena in welding operations was investigated. Welding and joining is a key unit operation in the construction of energy processing facilities. A better fundamental understanding of the heat and fluid flow phenomena and their role on the structure of the weldments produced may to lead to both the optimization of existing welding operations and to the development of novel dwelling and joining processes. DOE

N83-22601# Power Technologies, Inc., Schenectady, N. Y.
STUDY OF TURBINE-GENERATOR SHAFT PARAMETERS FROM THE VIEWPOINT OF SUBSYNCHRONOUS RESONANCE
F. P. deMello, K. Q. Chang, L. N. Hannett, J. W. Feltes, and J. M. Undrill Sep. 1982 206 p refs
(Contract EPRI-TPS-81-794)
(DE83-900540; EPRI-EL-2614) Avail: NTIS HC A10/MF A01

The susceptibility to subsynchronous resonance (SSR) problems in turbine generators as function of shaft, network and load characteristics is investigated. The evaluation of susceptibility was done through calculations of electrical damping to rotor speed perturbations and relating this to the value of modal damping required to cancel the estimated natural damping due to mechanical effects. The methodology of calculation is documented and results are presented for a number of network scenarios, machine and load characteristics. From these results some insight into the incidence of SSR phenomenon as function of shaft, machine, network and load characteristics was derived. DOE

N83-22602# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
HIGHLY EFFICIENT ARC-WELDING POWER SUPPLY
H. F. Bradburn and A. D. Donaldson 1982 3 p refs Presented at the 17th Intersoc. Energy Conversion Eng. Conf., Los Angeles, 8 Aug. 1982
(Contract DE-AC07-76ID-01570)
(DE83-000562; CONF-820814-34) Avail: NTIS HC A02/MF A01

The concept of inverter technology applied to arc welding power supplies is discussed. Completed projects jointly funded by industry and the Department of Energy that were undertaken to develop and accelerate implementation of this technology are reviewed. DOE

N83-22603# Los Alamos Scientific Lab., N. Mex. Chemistry and Materials Science Div.
EXPLOSION BONDING: ALUMINUM-MAGNESIUM ALLOYS BONDED TO AUSTENITIC STAINLESS STEEL
R. Alan Patterson 1982 30 p refs Presented at the ASME Winter Ann. Meeting, Phoenix, Ariz., 14 Nov. 1982
(Contract W-7405-eng-36)
(DE82-014080; LA-UR-82-1021; CONF-821101-3) Avail: NTIS HC A03/MF A01

The explosion bonding of 5000 series aluminum alloys to 300 series stainless steel alloys is summarized. The process technique involves a parallel gap arrangement with copper or aluminum bonding aids. Successful bonds were achieved by using either a single shot process for joining the trilayer clad or a sequential short technique for each metal component. Bond success is monitoring through a combined metallographic and tensile strength evaluation. It is shown that tensile properties are strongly dependent upon process parameters and the amount of intermetallic formation at the aluminum bond interface. Empirical data are compared with experimental and destructive test results to determine the optimum procedures. DOE

N83-22604# Rockwell International Corp., Golden, Colo. Energy Systems Group.
EFFECT OF CHEMISTRY VARIATIONS ON THE WELDABILITY OF COMMERCIALLY PURE VANADIUM SHEET
Thomas G. Glenn, George W. Elliston, Carl M. Edstrom, and Wilbur L. Johns 12 Feb. 1982 22 p refs
(Contract DE-AC04-76DP-03533)
(DE82-011462; RFP-3217) Avail: NTIS HC A02/MF A01

Tensile tests and metallographic examinations were done on electron beam welds on six different chemistries of vanadium. The welds were found to maintain base metal strengths even though large grains were present in the fusion zone. Nitrogen and oxygen were found to be the most effective strengtheners. The weld and surrounding area in material containing high nitrogen and oxygen exhibited higher hardness than the base metal. DOE

N83-22605# General Electric Co., Schenectady, N. Y. Gas Turbine Div.
HIGH-TEMPERATURE TURBINE TECHNOLOGY PROGRAM. VOLUME 1: EXECUTIVE SUMMARY Final Report
30 Nov. 1982 98 p
(Contracts DE-AC01-76ET-10340; EX-76-C-01-1806)
(DE83-004326; DOE/ET-10340/127-Vol-1) Avail: NTIS HC A05/MF A01

A high temperature gas turbine, for use in a combined cycle power plant operating on a coal derived fuel is developed to a status of technology readiness. Comprehensive descriptions of the resulting high temperature turbine component and system designs, test facilities and test hardware, technology testing and test results, and interpretation of the technology test results relative to component, subsystem, and system design performance and degree of technology readiness are included. DOE

N83-22606# General Electric Co., Schenectady, N. Y. Gas Turbine Div.
HIGH-TEMPERATURE TURBINE TECHNOLOGY PROGRAM. VOLUME 4: TURBINE DESIGN AND TECHNOLOGY SUPPORT TESTS Final Report
30 Nov. 1982 356 p refs
(Contracts DE-AC01-76ET-10340; EX-76-C-01-1806)
(DE83-004329; DOE/ET-10340/127-Vol-4) Avail: NTIS HC A16/MF A01

The Department of Energy High-Temperature Turbine Technology (HTTT) Program is a three-phase program with the objective of developing a high-temperature gas turbine, for use in a combined cycle power plant operating on a coal-derived fuel, to a status of technology readiness. This report documents the results of the work performed for Phase 2, the Technology Testing and Test Support Studies phase, of the HTTT Program. The specific objectives for Phase 2, component design and technology testing in critical areas, system design and trade-off analysis in support of component design and test, and combined cycle plant update studies, are directly related to the results of the Phase 1 program, Program and System Definition, documented in a DOE report (FE-1806-22) published in July 1977. The work reported in this document was initiated in August 1977, and includes comprehensive descriptions of the resulting high-temperature turbine component and system designs, test facilities and test hardware, technology testing and test results, and interpretation of the technology test results relative to component, subsystem, and system design performance and degree of technology readiness. Based on the success of the work accomplished during Phase 2 and reported in this document, the General Electric Company concludes that a confident commitment to a system verification

test can now be made and is appropriate as the next step toward the accomplishment of the overall program objective. This volume contains information on heat transfer and aerodynamic tests on the gas turbine and the design of turbine subsystems and components. DOE

N83-22607# General Electric Co., Schenectady, N. Y. Gas Turbine Div.
HIGH-TEMPERATURE TURBINE TECHNOLOGY PROGRAM. VOLUME 5: MATERIALS TECHNOLOGY DEVELOPMENT Final Report
30 Nov. 1982 515 p refs
(Contracts DE-AC01-76ET-10340; EX-76-C-01-1806)
(DE83-004330; DOE/ET-10340/127-Vol-5) Avail: NTIS HC A22/MF A01

A high temperature gas turbine, for use in a combined cycle power plant operating on a coal derived fuel was developed. Comprehensive descriptions of the resulting high temperature turbine component and system designs, test facilities and test results relative to component, subsystem, and system design performance and degree of technology readiness are included. DOE

N83-22608# Danish Welding Inst., Glostrup.
PROCESS DEPENDENT THRESHOLD LIMIT VALUES IN WELDING
Erik Beck Hansen 1982 113 p refs
(PB83-114157; Rept-82-38; ISBN-87-87806-53-3) Avail: NTIS HC A06/MF A01 CSCL 13H

Process dependent threshold limit values in welding and flame cutting are established. On the basis of the results from 978 measurements of air pollution, an analysis was carried out of the resulting threshold limit values (TLVRes) of fumes from welding and flame cutting. Through statistical treatment of the results of the measurements, the distribution of TLVRes was studied for arc welding with covered electrodes (MMA welding), gas shielded arc welding and flame cutting of unalloyed steels, and for tungsten inert gas shielded welding and MMA welding of stainless steel. GRA

N83-23235# National Inst. for Transport and Road Research, Pretoria (South Africa).
THE PERFORMANCE OF COMMERCIAL VEHICLE TIRES UNDER BRAKING CONDITIONS
J. C. Hillman *In* CSIR Ann. Transportation Conv., Vol. 4 1982 16 p (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N83-22609# MATRA Espace, Paris-Velizy (France). Service Fiability.
CALCULATION OF COMPLEX RELIABILITY BLOCK DIAGRAMS BY THE SO-CALLED CONDITION MATRICES METHOD [CALCUL DE BLOCS DIAGRAMMES COMPLEXES DE FIABILITE PAR LA METHODE DITE IMATRICES DE CONDITIONS]
D. Turinetti 1982 6 p In FRENCH Presented at 3rd Intern. Conf. on Fiabilite et Maintenance, Toulouse, 18-22 Oct. 1982 Sponsored by CNET, CNES, ESA and SEE
Avail: NTIS HC A02/MF A01

The matrices of conditions method permits easy calculation of block diagrams of reliability having numerous subordinates. The principle of the method proposed is that, given an architecture that is itself complex, this architecture can always be described in a form called matrix of conditions, whose reduction and analysis are the object of exhaustive development. This method avoids application of Bayes classic theorem which is very difficult, indeed impossible, to important on complex structures. Transl. by A.R.H.

N83-22610*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN OPTIMAL DIAGNOSTIC STRATEGY FOR FINDING MALFUNCTIONING COMPONENTS IN SYSTEMS
James T. Wong Mar. 1983 13 p refs Presented at the Joint Natl. Meeting of ORSA and TIMS, Chicago, 25-27 Apr. 1983
(NASA-TM-84335; A-9231; NAS 1.15:84335; USAAVRADCOM-83-A-7) Avail: NTIS HC A02/MF A01 CSCL 14D

A solution to the following problem is presented: Given that an n-component functional system is down, it is required to find a malfunctioning component of the system such that the expected expenditure is minimum. M.G.

N83-22611*# Lockheed-Georgia Co., Marietta.
AUTOMATED RELIABILITY AND FAILURE EFFECTS METHODS FOR DIGITAL FLIGHT CONTROL AND AVIONICS SYSTEMS. VOLUME 1: EVALUATION. VOLUME 2: METHODS SUMMARY
W. G. Ness, W. C. McCrary, M. S. Bridgman, E. F. Hitt, and S. M. Kenney Mar. 1981 168 p refs Sponsored in part by Federal Aviation Administration Prepared in cooperation with Battelle Columbus Labs., Ohio
(Contract NAS2-10270)
(NASA-CR-166148; NAS 1.26:166148; FAA-CT-83-8-Vol-1/2) Avail: NTIS HC A08/MF A01 CSCL 14D

A survey and assessment of reliability and failure effects prediction methods was presented. Survey of currently available methods and then selection of the most appropriate within the context of the project to establish the Digital Flight Controls Verification Laboratory (DFCSVL) was conducted. The reliability prediction program CARSRA and the fault tree program MFAULT were ultimately selected, delivered, and hosted on a CDC 7600. The evaluation of candidate methods for specific application to the DFCSVL is presented along with a general summary of the characteristics of each surveyed method. B.G.

N83-22612# Pacific Northwest Lab., Richland, Wash.
IMPROVING ULTRASONIC INSPECTION RELIABILITY Final Report
S. R. Doctor, M. D. Avioli, Jr., R. L. Barron, and R. L. Beverly Aug. 1982 124 p refs Sponsored by EPRI
(Contract DE-AC06-76RL-01830; EPRI Proj. 1448-1)
(DE83-001250; EPRI-NP-2568) Avail: NTIS HC A06/MF A01

The reliable detection and accurate characterization of service induced defects in light water reactor piping and pressure vessels has received considerable attention in the last few years. The work reported here concentrates on improving the reliability and reproducibility of ultrasonic testing (UT) inspections through three different approaches. First, the couplant layer influences the ultrasonic response of reflectors by modifying the energy transmitted through it. Data are provided to illustrate these effects, and an algorithm to guarantee adequate coupling is developed. Second, a specification to digitize UT signals will provide a standard to permit an expeditious exchange of data between EPRI researchers. Third, methods are discussed for characterizing UT equipment so that optimized ultrasonic systems can be assembled and so that subsystems can be screened to assure interchangeability. DOE

N83-22613# Los Alamos Scientific Lab., N. Mex.
THE FRAC (FAILURE RATE ANALYSIS CODE): A COMPUTER PROGRAM FOR ANALYSIS OF VARIANCE OF FAILURE RATES. AN APPLICATION USER'S GUIDE
R. J. Beckman and C. R. McInteer Mar. 1982 54 p refs
(Contract W-7405-eng-36)
(DE82-012017; NUREG/CR-2434) Avail: NTIS HC A04/MF A01

Probabilistic risk assessments (PRAs) require estimates of the failure rates of various components whose failure modes appear in the event and fault trees used to quantify accident sequences.

In the nuclear industry, the Nuclear Plant Reliability Data System (NPRDS) and the In-Plant Reliability Data System (IPRDS), among others, were designed for this purpose. An important characteristic of such data bases is the selection and identification of numerous factors used to classify each component that is reported and the subsequent failures of each component. However, the presence of such factors often complicates the analysis of reliability data in the sense that it is inappropriate to group (that is, pool) data for those combinations of factors that yield significantly different failure rate values. These types of data can be analyzed by analysis of variance. FRAC (Failure Rate Analysis Code) is a computer code that performs an analysis of variance of failure rates. In addition, FRAC provides failure rate estimates. DOE

N83-22614# Pacific Northwest Lab., Richland, Wash.
CLASSIFICATION OF NDE WAVEFORMS WITH AUTOREGRESSIVE MODELS
R. B. Melton Aug. 1982 14 p refs Presented at the Rev. of Progr. in Quant. NDE, San Diego, Calif., 1 Aug. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002036; PNL-SA-10446; CONF-820820-8) Avail: NTIS HC A02/MF A01

An approach for classifying NDE waveforms is described. Using this approach a set of matched filters are constructed, one for each category of waveforms based on parameters from autoregressive models. The method offers advantages in terms of hardware implementation over conventional pattern recognition approaches. Feasibility is shown using computer generated data. Results are then presented for real data from acoustic emission experiments. DOE

N83-22615# California Univ., Livermore. Lawrence Livermore Lab.
SOME FUNDAMENTAL ASPECTS OF FAULT-TREE AND DIGRAPH-MATRIX RELATIONSHIPS FOR A SYSTEMS-INTERACTION EVALUATION PROCEDURE
H. P. Alesso 28 Feb. 1982 36 p refs
(Contract W-7405-eng-48)
(DE82-016039; UCID-19131) Avail: NTIS HC A03/MF A01

Some fundamental mathematical background of both fault-oriented and success-oriented risk analyses are reviewed in order to bring out the advantages and disadvantages of each. In addition, it outlines several fault-oriented/dependency analysis approaches and several success-oriented/digraph-matrix approaches. A broad perspective of options for solving the systems interaction problem is outlined. DOE

N83-22616# Danish Welding Inst., Glostrup.
RECENT ADVANCES IN THE DOCUMENTATION OF ULTRASONIC WELD INSPECTION
Sven Erik Iversen 1982 25 p
(PB83-116145; Rept-82-39) Avail: NTIS HC A02/MF A01 CSCL 13H

The P-scan system developed for producing permanent of ultrasonic weld inspections in the form of complete projection images of the interior of the welds is subject to constant improvement and refinement. Position scanners, manual and automatic, for the precise location of all echo sources were developed and tested in industrial practice at a great variety of applications. The difficulties encountered in the inspection of pipe welds in complicated pressure piping systems with a minimum of accessability were eliminated through miniaturized pipe scanners. Various particularly valuable features of the projection image scanning system are presented, including hardware and software facilities for the detection and recording of transverse cracks in pipe welds. GRA

N83-22617# United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
A PULSED TUNED CIRCUIT EDDY-CURRENT SYSTEM FOR NDT
K. D. Boness Nov. 1982 20 p refs
(AERE-M3245) Copyright. Avail: Issuing Activity

Resonant circuit dual-parameter eddy current systems have been used successfully in Harwell instrumentation. An alternative approach is described which extends and enhances this method. Replacing the oscillation circuit by a pulsed tuned circuit overcomes ambiguities concerning the amplitude parameter, gives absolute time reference and can be extended to be a simultaneous multiparameter test system. Author

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N83-22618# British Library Lending Div., Boston Spa (England).
INFLUENCE OF THE IMPACT POTENTIAL ENERGY ON THE IMPACT VISCOSITY OF METAL TUBES
N. E. Protskii and V. V. Ovdienko 4 Jan. 1983 6 p refs Transl. into ENGLISH from Zavod. Lab. (USSR), v. 48, no. 1, 1982 p 80-82
(BLL-WH-530-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The extent of the effect of the impact energy reserve on the results of the impact bending test on various types of sample were determined. The maximum impact energy (potential energy) K sub P should be such that the actual impact work K is at least 10% of the maximum works. The impact work depends not only on the metal properties but also on the dimensions of the samples (cross section) and type of concentrator. This means that a different impact potential energy is selected for different sample dimensions depending on the level of sample properties. Since the impact testers (pendulum hammers) available in factory laboratories do not always afford this range of choice, it is extremely important to make a quantitative estimate of the impact potential energy not only within but also beyond the limits laid down in GOST 9454 - 78. S.L.

N83-22619# British Library Lending Div., Boston Spa (England).
PHOTOELASTIC STUDY OF THREE-DIMENSIONAL STRESS NEAR A CRACK
L. A. Radugina, V. A. Morozov, and N. A. Chelyshev [1983] 4 p refs Transl. into ENGLISH from Proceedings of the 8th All-Union Conf. on Photoelasticity, vol. 3, 1979 p 150-151 Conf. held in Tallinn, USSR, 25-28 Sep. 1979
(BLL-Risley-Tr-4214-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Internal, closed cracks in the volume of the model were generated by an intense laser beam acting on ED-16 MITFA Epoxy resin. The results of a large number of tests were used to determine the linear dimensions of the cracks as a function of the number of irradiations and the energy of the laser pulse. From this it was possible to formulate a number of conditions under which cracks having given dimensions and orientations could be generated in the given volume of the model. These conditions are individual to each particular case. A possible obstacle to the use of this method of initiating cracks could be the existing assumptions about the deterioration in the optical, physical and mechanical properties of the photoelastic material in the damaged zone caused by the pulsed thermal field. A fractographic investigation was therefore made of the surface, and micro-hardness and optical and physical properties in the laser-affected zone were measured. L.F.M.

N83-22620# Central Electricity Generating Board, London (England).
THERMAL CYCLING TESTS ON FERRITIC-AUSTENITIC STEEL WELDS
E. Jahn [1981] 12 p refs Transl. into ENGLISH from VGB Kraftwerkstech (West Germany), v. 61, no. 6, 1981 p 509-512
(BLL-CE-Trans-7922) Avail: British Library Lending Div., Boston

Spa, Engl.

Although no austenitic steel was used in Germany since the 60s in boilers, the question as to the proper way of welding heat resistant ferritic and austenitic steels is important wherever austenites must be used at high temperature, for instance in chemical plants or in nuclear engineering. In accordance with present knowledge and experience and results of our own experiments welding using a Ni basis alloy of the type Inconel 600 as a filler has established itself as the only proper way to weld ferrite and austenite. Author

N83-22621 British Library Lending Div., Boston Spa (England).
BEHAVIOUR OF UNSTABLE FRACTURE AFTER STABLE DUCTILE CRACK GROWTH. UNSTABLE FRACTURE FROM STABLE FIBROUS CRACK GROWTH
Takeshi Kanazawa, Susumu Machida, and Shuji Aihara 20 Dec. 1982 22 p refs Transl. into ENGLISH of conf. paper presented at the Autumn Meeting of the Japan Soc. of Naval Architects, Nov. 1979 Conf. held Nov. 1979
(BLL-Risley-Tr-4684-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The conditions for the transition to unstable fracture using the J-integral R curve and an instability condition is derived for bending tests are investigated. An instability condition is derived for bending tests. Bending tests where the compliance of the load application system was raised, were carried out using soft steel and the influence of the compliance on the occurrence of unstable fracture following stable ductile crack growth was determined. Author

N83-22622*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE N/REV PHENOMENON IN SIMULATING A BLADE-ELEMENT ROTOR SYSTEM
R. E. McFarland Mar. 1983 11 p
(NASA-TM-84344; A-9268; NAS 1.15:84344) Avail: NTIS HC A02/MF A01 CSCL 20K

When a simulation model produces frequencies that are beyond the bandwidth of a discrete implementation, anomalous frequencies appear within the bandwidth. Such is the case with blade element models of rotor systems, which are used in the real time, man in the loop simulation environment. Steady state, high frequency harmonics generated by these models, whether aliased or not, obscure piloted helicopter simulation responses. Since these harmonics are attenuated in actual rotorcraft (e.g., because of structural damping), a faithful environment representation for handling qualities purposes may be created from the original model by using certain filtering techniques, as outlined here. These include harmonic consideration, conventional filtering, and de-contamination. The process of decontamination is of special interest because frequencies of importance to simulation operation are not attenuated, whereas superimposed aliased harmonics are. S.L.

N83-22623*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BENDING STIFFNESS OF MULTIWALL SANDWICH
Max L. Blossner Apr. 1983 45 p refs
(NASA-TM-84613; L-15549; NAS 1.15:84613) Avail: NTIS HC A03/MF A01 CSCL 20K

An analytical and experimental study was carried out to understand the extensional and flexural behavior of multiwall sandwich, a metallic insulation composed of alternate layers of flat and dimpled foil. The multiwall sandwich was structurally analyzed by using several simplifying assumptions combined with a finite element analysis. The simplifying assumptions made in this analysis were evaluated by bending and tensile tests. Test results validate the assumption that flat sheets in compression do not significantly contribute to the flexural stiffness of multiwall sandwich for the multiwall geometry tested. However, calculations show that thicker flat sheets may contribute significantly to bending stiffness and cannot be ignored. Results of this analytical approach compare well with test data; both show that the extensional stiffness of the dimpled sheet in he 0 deg direction is about 30 percent of that for a flat sheet, and that in the 45 deg direction, it is about 10 percent. The analytical and experimental multiwall bending stiffness showed good agreement for the particular geometry tested. M.G.

N83-22624*# Missouri Univ., Rolla. Dept. of Engineering Mechanics.
ANALYSIS OF A HYBRID-UNDIRECTIONAL BUFFER STRIP LAMINATE
Lokeswarappa R. Dharani and James G. Goree (Clemson Univ.) [1983] 23 p refs
(Grant NsG-1297)
(NASA-CR-170184; NAS 1.26:170184) Avail: NTIS HC A02/MF A01 CSCL 20K

A method of analysis capable of predicting accurately the fracture behavior of a unidirectional composite laminate containing symmetrically placed buffer strips is presented. As an example, for a damaged graphite/epoxy laminate, the results demonstrate the manner in which to select the most efficient combination of buffer strip properties necessary to inhibit crack growth. Ultimate failure of the laminate after the arrest can occur under increasing load either by continued crack extension through the buffer strips or the crack can jump the buffer strips. For some typical hybrid materials it is found that a buffer strip spacing to width ratio of about four to one is the most efficient. Author

N83-22625# Aeronautical Research Labs., Melbourne (Australia). Dept. of Defence Support.
SPECIAL FINITE ELEMENTS FOR SHEETS WITH LOADED CIRCULAR HOLES
K. C. Watters Jun. 1982 34 p refs
(ARL-STRUC-Rept-392; AR-002-895) Avail: NTIS HC A03/MF A01

A special hybrid finite element to represent a loaded hole in a sheet is described. The shape functions of the element satisfy stress equilibrium and strain compatibility throughout the element, and the applied loading boundary conditions. The applied loading is represented by a finite Fourier series, and the coefficients of the element shape functions are matched with the Fourier coefficients. A computer program was written to generate the element stiffness and stress recovery matrices. The program also produces equivalent nodal forces and initial stresses related to the applied loading. Accurate results are obtained from several example analyses. S.L.

N83-22626# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE SHEAR DEFORMATION THEORY FOR DYNAMIC ANALYSIS OF BEAMS
A. V. Krishna Murty Feb. 1983 34 p refs Submitted for publication
(INPE-2657-PRE/270) Avail: NTIS HC A03/MF A01

Timoshenko's shear deformation theory is widely used for the dynamical analysis of shear flexible beams. A comparative study of the shear deformation theory with a higher order model, of which Timoshenko's sher deformation model is a special case, is presented. Results indicate that while Timoshenko's shear deformation theory gives reasonably accurate information regarding the set of bending natural frequencies, there are considerable discrepancies in the information it gives regarding the model shapes and dynamic response, and so there is a need to consider higher order models for the dynamical analysis of flexure of beams. Author

N83-22627# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALYSIS OF SANDWICH BEAMS
Achyutuni Venkata Krishna Murty Mar. 1983 36 p refs
(INPE-2687-PRE/286) Avail: NTIS HC A03/MF A01

A new sandwich beam theory, with provision for cubic fiber stress and quadratic shear stress distribution across the depth of the beam, is given. Classical shear deformation theory is a special

case of this formulation. This theory has been applied to honey comb cored and superplastically formed diffusion bonded cored sandwich beams. From the results, it is concluded (1) the present theory is capable of giving appropriate stress distributions throughout the beam, including the fixed end (2) superplastically formed diffusion bonded cored sandwich beam exhibits superior structural performance. Author

N83-22628# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE MEASUREMENT OF RESIDUAL STRESSES OF GENERAL ORIENTATION BY X-RAY DIFFRACTION TECHNIQUES
H. Doelle and V. Hauk 1983 14 p refs Transl. into ENGLISH from Haerterei-Techn. Mitt. (West Germany), v. 31, no. 3, 1976 p 165-168
(NRC/CNR-TT-2055; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

To determine stresses from lattice spacings d sub phi psi measured by X-ray diffraction in dependence of the directions defined by (phi psi), the sq sin psi technique is used, assuming linearity between d sub phi psi and sq sin psi. However, deviations are determined from linearity through experimentation. Nonlinear d sub phi psi via sq sin psi dependencies attributed to very characteristic texture and stresses are discussed. Arc shaped stresses with psi > or < 0 deviatons from the linear were determined expermentally with polished specimens. Experimental analysis of deformed running surfaces of antifriction elements resulted in the same dependencies. The reason for this nonlinearity is a residual stress system lying outside the specimen system (the system measured). Conditions and means by which arc shaped strain distributions can be evaluated are described. S.L.

N83-22629*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
EXPERIMENTAL CREEP DATA FOR A BUILT-UP ALUMINUM/TITANIUM STRUCTURE SUBJECTED TO HEATING AND LOADING
Jerald M. Jenkins and Christopher A. Montoya Mar. 1983 34 p ref
(NASA-TM-84906; NAS 1.15:84906) Avail: NTIS HC A03/MF A01 CSCL 20K

Experimental creep, temperature, and strain data resulting from a laboratory experiment on a built-up aluminum/titanium structure are presented. The structure and the experiment are described in detail. A heating and loading experiment lasting approximately six hours is conducted on a test structure. Considerable creep strain resulted from compressive stresses in the heated skin. Large residual stresses were found after the experiment was completed. The residual stresses in the substructure frames were large enough to preclude further cycles of creep experiments with this built-up structure because of concern that the frame webs would buckle. Author

N83-22630# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
CONSTRAINED AND UNCONSTRAINED VARIATIONAL FINITE ELEMENT FORMULATION OF SOLUTIONS TO A STRESS WAVE PROBLEM: A NUMERICAL COMPARISON Final Report
Julian J. Wu and C. N. Shen Oct. 1982 33 p refs Presented at the Army Numerical Anal. and Computer Conf., Vicksburg, Miss., 3-4 Feb. 1982
(DA Proj. 1L1-61102-AH-60)
(AD-A122280; AD-E440168; ARLCB-TR-82032) Avail: NTIS HC A03/MF A01 CSCL 12/1

Unconstrained variational formulation has been applied to initial, boundary value problems previously with some numerical success. More recently, an adjoint bilinear variational principle has also been developed for initial and initial-boundary value problems which requires that the initial conditions be satisfied exactly and hence is a constrained variational formulation. This present report compares the numerical results of these two variational formulations for the case of a stress wave problem in a uniform bar. GRA

N83-22631# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
NUMERICAL SOLUTIONS USING ADJOINT VARIATIONAL FORMULATION TO STRESS WAVE PROBLEMS Final Report
C. N. Shen and J. J. Wu Sep. 1982 22 p ref Presented at the Army Numerical Analysis and Computer Conf., Vicksburg, Miss., 3-4 Feb. 1982
(DA Proj. 1L1-61102-AH-60)
(AD-A122257; AD-E440171; ARLCB-TR-82028) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report deals with the numerical implementation of an involved analysis in conjunction with cubic Hermite polynomials as the approximate functions. The specific example used for numerical results is the longitudinal stress wave of a uniform bar. First, the adjoint principle associated with this problem is stated. It is followed by the discretized counterparts in spatial and temporal dimensions. The procedures involving the assemblage of the 'mass' and 'stiffness' matrices in the two dimensions are described. Due to the null variations of some adjoint variables, certain rows of the matrices are eliminated. Because certain variables are known at the boundaries, the unknown variables for the next interval of time can be computed by inversion of a band matrix in terms of their present values. GRA

N83-22632# Los Alamos Scientific Lab., N. Mex.
BUCKLING OF STEEL CYLINDERS CONTAINING CIRCULAR CUTOUTS REINFORCED ACCORDING TO THE AREA-REPLACEMENT METHOD
R. C. Dove, J. G. Bennett, and T. A. Butler 1982 8 p refs Presented at Joint Conf. on Experimental Mechanics, Honolulu, Hawaii, 22 May 1982
(Contract W-7405-eng-36)
(DE82-008126; LA-UR-82-335; CONF-820516-6) Avail: NTIS HC A02/MF A01

The effect of the use of the area replacement method (ARM) for reinforcing circular penetrations in cylindrical steel shells was studied both experimentally and analytically. How this type of reinforcement affects the buckling strength of a shell subjected to uniform axial compression is the specific area of investigation. In shells that are of such a quality that the penetration reduces the buckling strength, the use of the ARM will increase the bucking strength of the shell. The conservative knockdown factors suggested for buckling design by the American Society of Mechanical Engineer's (ASME) Boiler and Pressure Vessel Code should ensure an adequate margin to failure under this loading condition. DOE

N83-22633# Brown Univ., Providence, R. I. Div. of Engineering.
FINITE-ELEMENT STUDY OF THE ASYMPTOTIC NEAR-TIP FIELDS FOR MODE I PLANE STRAIN CRACKS GROWING STABLY IN ELASTIC IDEALLY PLASTIC SOLIDS
T-L. Sham (Rensselaer Polytechnic Inst., Troy, N.Y.) Aug. 1982 52 p refs Submitted for publication
(Contract DE-AC02-80ER-10556)
(DE83-004250; DOE/ER-10556/93) Avail: NTIS HC A04/MF A01

The asymptotic analyses predict the crack opening rate delta at a small distance r from the growing crack tip under contained yielding conditions. The finite element solutions generated are very detailed, with the maximum extent of the plastic zone being about 100 times the smallest element size. This high resolution in the finite element element solution enables the correlation of the finite element results with the asymptotic crack opening rate to be made and the expressions for the parameters (-) and R to be determined. Various crack growth histories are simulated by relaxing the nodal force at the crack tip and simultaneously increasing the external applied load in order to investigate the possible dependence of (-) and R on the crack growth history. The maximum amount of crack growth simulated is about 20% of the maximum extent of the plastic zone size. The numerical results reveal that a well defined elastic unloading sector develops and moves with the advancing crack tip and its location coincides well with that predicted by the asymptotic analysis. Estimation gives (ALPHA)

= 5.46, which is in very good agreement with the asymptotic result. The parameter (-) is found to be independent of the crack-growth histories examined and has a value of 0.58. An attempt to relate R to the quantity EJ/sigma/sub o/(2) is made. However, it is found that the parameter s, defined by s identical with R/(EJ/sigma/sub o/(2)), varies in a range 0.113 to 0.133 for the crack-growth histories simulated. DOE

N83-22634# Argonne National Lab., Ill.
THE DYNAPCON: A COMPUTER CODE FOR DYNAMIC ANALYSIS OF PRESTESSED CONCRETE STRUCTURES
A. H. Marchertas Sep. 1982 63 p refs
(Contract W-31-109-eng-38)
(DE83-004399; ANL-82-77) Avail: NTIS HC A04/MF A01

A finite element computer code for the transient analysis of prestressed concrete reactor vessels (PCRVs) for LMFBR containment is described. The method assumes rotational symmetry of the structure. Time integration is by an explicit method. The quasistatic prestressing operation of the PCRV model is performed by a dynamic relaxation technique. The material model accounts for the crushing and tensile cracking in arbitrary direction in concrete and the elastic/plastic behavior of reinforcing steel. The variation of the concrete tensile cracking and compressive crushing limits with strain rate is considered. Relative slip is permitted between the concrete and tendons. Several example solutions are presented and compared with experimental results. These sample problems range from simply supported beams to small scale models of PCRV's. It is shown that the analytical methods correlate quite well with experimental results, although in the vicinity of the failure load the response of the models tend to be quite sensitive to input parameters. DOE

N83-22635# Utah Univ., Salt Lake City. Dept. of Materials Science and Engineering.
IMPURITY EFFECTS ON THE CREEP OF POLYCRYSTALLINE MAGNESIUM AND ALUMINUM OXIDES AT ELEVATED TEMPERATURES Final Technical Progress Report, 1 Apr. 1966 - 30 Sep. 1981
R. S. Gordon 1982 47 p refs
(DE82-009185; DOE/ER-01591/35; COO-1591-35) Avail: NTIS HC A03/MF A01

Well defined examples of diffusional creep were identified in polycrystalline MgO, Al2O3 TiO2, and mullite. The effect of substitutional cation impurities (e.g., Fe in MgO; Fe, Mn, Cr, Ti, Mg-Ti, Fe-Ti, and Mn-Ti in Al2O3; and Ta in TiO2) on processes which are important in diffusional creep was studied. With the exception of Ta additions to TiO2 and Cr additions to Al2O3, all dopants increased the diffusional creep rates by enhancing cation lattice diffusion, cation grain boundary diffusion or both. DOE

N83-22636# Sandia Labs., Albuquerque, N. Mex.
LARGE-STRAIN SHEAR RESPONSE OF UNIDIRECTIONAL BORON/ALUMINUM
E. D. Reedy, Jr. 1982 7 p refs Presented at Joint Conf. on Expt. Mech., Honolulu, Hawaii, 22 May 1982
(Contract DE-AC04-76DP-00789)
(DE82-007763; SAND-81-1915C) Avail: NTIS HC A02/MF A01

Data characterizing the shear response of unidirectionally reinforced boron/aluminum are presented. The symmetric rail shear test method was used to make the measurements. Results are given for 5.6 mil diameter boron fibers in either an 1100 or a 6061 aluminum matrix. The boron/6061 aluminum was tested in both the as-fabricated and a heat treated condition. The composite data are used to define matrix shear stress strain relations in a manner suitable for shear lag analyses of flawed composites. Analyses of center notched tensile specimens are in excellent agreement with experiment. DOE

N83-22637# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF A SIMPLE BIAXIAL STRAIN TEST
R. D. Steit 8 Feb. 1982 8 p Presented at the Joint Conf. on Experimental Mech., Honolulu, Hawaii, 22-30 May 1982
(Contract W-7405-eng-48)
(DE82-008243; UCRL-87237; CONF-820516-9) Avail: NTIS HC A02/MF A01

Materials which obey a maximum tensile stress failure criteria can fail at strains in biaxial tension which are significantly below the uniaxial failure strain. First, a failure strain envelope is developed which accounts for the degree of biaxiality and the work hardening of the material. A material test which would account for the various states of biaxiality is then proposed. By deforming a flat plate into a prescribed surface, different states of biaxial strain can be achieved. The development of such a biaxial test as a cost-effective and reliable means of screening certain materials is presented. The test is compatible with most drop weight test facilities and can be used to screen materials over a wide variety of temperature and strain rates. DOE

N83-22638# Sandia Labs., Albuquerque, N. Mex.
WHAT IS STIFFNESS?
L. F. Shampine 1982 28 p Presented at the Intern. Conf. on Stiff Computation, Park City, Utah, 12 Apr. 1982
(Contract DE-AC04-76DP-00789)
(DE82-011946; SAND-82-0782C; CONF-820425-1) Avail: NTIS HC A03/MF A01

It is assumed that the function f is continuous and satisfies the Lipschitz condition. This guarantees that the initial value problem has a unique solution y(x). In the classical situation when L(b-a) is not large, this also implies that y(x) is moderately stable. Step by step methods for approximating numerically, select at each step a step size H sub n+1 intended to satisfy the local truncation error requirement. There are other restrictions on the step size, too, but in the classical situation they cannot be a severe restriction except in the case of very frequent output for some methods and some implementations. DOE

N83-22639# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.
FINITE-ELEMENT FORMULATION FOR LARGE STRAIN: LARGE DEFORMATION PROBLEMS IN PLASTICITY AND VISCOPLASTICITY
Abhijit Chandra and Subrata Mukherjee Apr. 1982 70 p refs
(Contract DE-AC02-82ER-12038)
(DE83-004500; DOE/ER-12038/1) Avail: NTIS HC A04/MF A01

A complete stress analysis of a metal forming process is necessary to assess the onset of metal forming defects such as the initiation of internal or surface cracks or the generation of residual stresses. For the study of forming with rate independent materials,it is sufficient to use an elastic-plastic analysis. It is well known, however, that metal forming, both at room and elevated temperatures, can be rate dependent. This requires the use of a time dependent inelastic constitutive model for material behavior. The finite element formulation developed through a weighted residual approach of Galerkin type, which is also equivalent to the principle of virtual work, does not rely on the existence of a homogeneous rate potential function of second degree. Thus, it can be used for time dependent consititive models where such a rate potential may not exist. A program to evaluate the complete stress distribution was developed and applied to the extrusion process using an updated Lagrangian approach. The stress fields obtained for elastic-plastic materials exhibit features which are consistent with the known development of extrusion defects. DOE

N83-22640# Sandia Labs., Albuquerque, N. Mex.
PRESSURE-SHEAR LOADING TECHNIQUES FOR MATERIAL PROPERTY STUDIES
L. C. Chhabildas and R. D. Hardy 1982 12 p refs Presented at the 33rd Meeting of Aeroballistic Range Assoc., Santa Barbara, Calif., 18 Aug. 1982
(Contract DE-AC04-76DP-00789)
(DE82-020983; SAND-82-1546C; CONF-820872-1) Avail: NTIS HC A02/MF A01

Experimental loading techniques are described which allow a detailed study of material response under more general loading conditions than achieved in conventional uniaxial strain experi-

ments. These techniques allow the use of smooth bore guns to generate well-controlled one-dimensional combined pressure-shear waves in flat plates. A velocity interferometer technique used to determine both longitudinal and shear particle velocity at the target free surface is also described. DOE

N83-22641# California Univ., Livermore. Lawrence Livermore Lab.
INTRODUCTION TO STRUCTURAL DYNAMICS WITH APPLICATIONS, APPENDIX
D. W. Coats, R. C. Murray, and T. A. Nelson Jul. 1982 335 p
(Contract W-7405-eng-48)
(DE83-000023; UCID-19408-App) Avail: NTIS HC A15/MF A01

These slides were prepared as a basic outline of topics on structural dynamics. The course consisted of 20 fifty-five minute sessions that were recorded on video tape for TV playback. This appendix contains copies of the slides used in the video tape sessions. The lectures covered topics such as: formulation of the equation of motion for single degree of freedom systems; undamped and damped free vibration response; characteristics of earthquakes; response to earthquake loading; modeling of multiple degree of freedom systems; mode superposition analysis; and response spectra analysis. DOE

N83-22642# California Univ., Livermore. Lawrence Livermore Lab.
CYCLIC-STRESS-STRAIN BEHAVIOR OF RUBBER
D. R. Lesuer, R. H. Cornell, and S. D. Santor 12 Feb. 1982 8 p refs Presented at the SESA Spring Conf., Honolulu, Hawaii, 22-30 May 1982
(Contract W-7405-eng-48)
(DE82-013856; UCRL-86688; CONF-820516-10) Avail: NTIS HC A02/MF A01

Rubber in general exhibits nonlinear viscoelastic behavior. One manifestation of this nonlinearity is a variation in the dynamic moduli with strain amplitude. However, a closer examination of the dependence of dynamic moduli on strain suggests that for engineering problems, a linear viscoelastic treatment may provide an adequate representation of the constitutive behavior of rubber, provided the moduli are evaluated at the strain range and loading frequency of interest. This presentation describes an experimental study into the suitability and limitations of a simple linear viscoelastic model used in several large deformation finite element computer codes. The procedure was to obtain the cyclic stress-strain behavior of a rubber suitable for use in a load bearing application and compare the results with the stress-strain response predicted by the finite element code NIKE2D. This code was developed to study the finite strain response of solids subjected to axisymmetric or plane strain deformation. DOE

N83-22643# Brookhaven National Lab., Upton, N. Y.
STRESS AND STRAIN EFFECTS ON THE PROPERTIES OF COMPOSITE SUPERCONDUCTORS
David O. Welch 1982 10 p refs Presented at the 9th US Natl. Congr. of Appl. Mech., Ithaca, N.Y., 21 Jun. 1982
(Contract DE-AC02-76CH-00016)
(DE82-016212; BNL-31340; CONF-820614-3) Avail: NTIS HC A02/MF A01

Practical superconductors for use in the production of high magnetic fields are generally in the form of composites of filaments of superconducting material embedded in a matrix of normally conducting material. Lorentz forces which arise during magnet operation are examples of sources of external stress, while internal stresses can arise during the fabrication of the composite superconductor, primarily due to differential thermal contraction between different materials in the composite. The properties of superconducting compounds are often sensitive functions of the elastic strain state in the compound; consequently there is a strong coupling between the mechanical and electrical properties of composite superconductors. The basic features of this phenomenon will be illustrated by a discussion of the properties of simple composite superconductors. DOE

N83-22644# Liege Univ. (Belgium).
FATIGUE BEHAVIOR OF AUTOMATICALLY WELDED BEAMS OF LARGE DIMENSION AND GREAT THICKNESS. FIRST SERIES OF TESTS [COMPORTEMENT A LA FATIGUE DE POUTRES DE GRANDES DIMENSIONS ET DE FORTES EPAISSEURS SOUDEES AUTOMATIQUEMENT (PREMIERE SERIE D'ESSAIS)]
Jacques DHuart and Eugene Piraprez (Centre de Recherche Scientifiques et Techniques de l'industrie des Fabrications Metalliques) Nov. 1982 35 p refs In FRENCH Sponsored by Ministere des Travaux Publics
(CRIF-MT-150) Avail: NTIS HC A03/MF A01

Four large welded joints with very thick plates were subjected to fatigue tests to determine if the welding mode (manual or automatic) and the type of bead (angled or in K) influence their behavior in actual construction. The automatic welding procedure appears to introduce more important residual stresses than does the manual procedure. The stresses introduced under the first load provoke local plastification and redistribution of residual stresses. Under the second load, the behavior of the test specimens is perfectly elastic. These girders all have good resistance to fatigue and the parameters considered do not affect their total behavior.
Transl. by A.R.H.

N83-22645# Illinois Univ., Urbana-Champaign. Dept. of Civil Engineering.
EFFECT OF GROUND MOTION CHARACTERISTICS ON THE SEISMIC RESPONSE OF TORSIONALLY COUPLED ELASTIC SYSTEMS Ph.D. Thesis
Shyh-Yuan Kung and D. A. Pecknold Jun. 1982 340 p refs
(Grants NSF ENV-77-07190; NSF PFR-80-02582)
(PB83-124602; UILU-ENG-82-2009; STRUCTURAL-RES-SER-500; NSF/CEE-82038) Avail: NTIS HC A15/MF A01 CSCL 13M

A probabilistic approach to a study of the effects of ground motion on torsionally coupled elastic systems is presented. The characteristics of ground motions are discussed and frequency content, time varying intensity and duration, and direction are modeled. Isolated acceleration pulses and ground motion spatial correlation characteristics are illustrated with a white noise model. The methos used for computing structural responses to the ground motion models are described and an algorithm is devised for evaluating the nonstationary response statistics of general multidegree-of-freedom systems to the excitations of various models. The effects of various ground motion characteristics on single-degree-of-freedom systems are considered as are the effects of ground motion on the response of single-story torsionally coupled systems. Also noted are the responses of a special class of torsionally coupled tall buildings. A numerical example for an eight-story building is provided. GRA

N83-22646# Texas A&M Univ., College Station. Structural Engineering Lab.
SHEAR STRENGTH AND DETERIORATION OF SHORT REINFORCED CONCRETE COLUMNS UNDER CYCLIC DEFORMATIONS
Jul. 1982 278 p refs
(Grant NSF PFR-77-20816)
(PB83-127845; PMFSEL-82-3; NSF/CEE-82037) Avail: NTIS HC A13/MF A01 CSCL 13C

Ten short columns with rectangular cross sections were tested and the results were compared with those of square columns tested previously. Loading history and level of axial load were the main variables. It was concluded that the maximum capacities of columns subjected to diagonal unidirectional loading could be estimated by an interaction line connecting the maximum capacities of each column under unidirectional loading along the principal axis. An empirical equation for the shear strength of the columns was derived using data from continuous beams failing in shear and was calibrated using results of the short column tests. It was found that more than 70 percent of the total shear capacity was contributed by the concrete in the column. Shear criteria were proposed and an evaluation of columns meeting the proposed

criteria revealed that strength and energy dissipating capacities were maintained under severe loading conditions. GRA

N83-22647# Arizona Dept. of Transportation, Phoenix. Transportation Research Center.
FIELD AND LABORATORY EVALUATION OF SULFUR ASPHALT PATCHING MATERIALS Final Report, Sep. 1978 - Aug. 1982
Frank R. McCullagh Aug. 1982 19 p refs Sponsored in part by Federal Highway Administration, Phoenix, Ariz.
(PB83-128819; FHWA/AZ-82/175) Avail: NTIS HC A02/MF A01 CSCL 13C

Patching deteriorated pavement is an important maintenance function. Presently used procedures and materials for patching are not always effective due to adverse weather, materials used, and procedures. Sulfur Asphalt Sand (SAS) materials have the potential for producing superior patches since they are pourable, require no compaction, and are highly stable. SAS patching materials were developed in the laboratory using marginal aggregate sources and sulfur. Field trials using the Mini Cycle and the SAS patching materials were not satisfactory because of high SO2 (greater than 50 ppm) emissions. The Mini Cycle will not be used to place any SAS patches but it was effective in placing recycled asphalt patches. Author (GRA)

N83-22257*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE DAMPING OF A FLEXIBLE BEAM
Garnett C. Horner *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 1-8 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22258*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DECOUPLING AND OBSERVATION THEORY APPLIED TO CONTROL OF A LONG FLEXIBLE BEAM IN ORBIT
Harold A. Hamer *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 9-38 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22266*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NONLINEAR EFFECT ON MODAL DATA ANALYSIS METHOD
Lucas G. Horta *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 135-140 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22267*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL DESIGN FOR DYNAMIC RESPONSE REDUCTION
Brantley R. Hanks *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 141-150 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22276*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE CONTROL OF A FLEXIBLE BEAM
Jeffrey P. Williams *In its* Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 235-247 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22277*# Virginia Univ., Charlottesville.
OPTIMAL DAMPING FOR A TWO-DIMENSIONAL STRUCTURE
W. D. Pilkey and B. P. Wang *In* NASA. Langley Research Center Structual Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 249-262 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 20K

N83-22473# Tufts Univ., Medford, Mass. Dept. of Mechanical Engineering.
SUBSTRUCTURE ANALYSIS OF VIBRATING SYSTEMS
R. Greif and L. Wu *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol 15, no. 2 Jan. 1983 p 17-24 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

N83-22474# Michigan State Univ., East Lansing. Dept. of Mechanical Engineering.
EMPIRICAL MODAL ANALYSIS
M. N. Rizai, J. E. Bernard, and J. M. Starkey (Purdue Univ., Lafayette, Ind.) *In* Shock and Vibration Information Center The Shock and Vibration Digest, v. 15, no. 2 Jan. 1983 p 25-30 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

N83-22478# Technical Univ. of Denmark, Lyngby. Dept. of Ocean Engineering.
BEAM MODELS FOR SHIP HULL VIBRATION ANALYSIS
J. J. Jensen *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, No. 2 Feb. 1983 p 23-27 refs (For primary document see N83-22475 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

N83-22657# Hokkaido Univ., Sapporo (Japan).
HARDNESS OF WET SNOW
Kaoru Izumi and Eizi Akitaya *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 89-97 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

42 GEOSCIENCES (GENERAL)

N83-22648# Hokkaido Univ., Sapporo (Japan). Inst. of Low Temperature Science.
LOW TEMPERATURE SCIENCE. SERIES A: PHYSICAL SCIENCES
1982 241 p refs In ENGLISH and JAPANESE
(ISSN-0439-3538) Avail: NTIS HC A11/MF A01

Studies in low temperature science were undertaken. Some of the topics presented are: crystallization of single crystal and polycrystalline ice; snow cover on a mountain slope; cold air flow on snow surfaces; shapes of snow drifts and wind speed distribution; yearly variations in snow accumulation; snow layer on sea ice; short term variations in heat budget with the growth of sea ice; oceanic structure of a frontal region of warm currents; behavior of snow cover on mountain slopes; disruption of snow flakes in electric fields; and brine drainage channel of sea ice. For individual titles, see N83-22649 through N83-22671.

N83-22649# Hokkaido Univ., Sapporo (Japan).
CRYSTALLOGRAPHIC ORIENTATION OF RECRYSTALLIZED GRAIN IN STRAINED SINGLE CRYSTAL OF ICE **c76**
Mutsumi Ohtomo and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 1-11 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Growth of a recrystallized grain as related to kinetic condition is discussed. It is assumed that grain boundary of the recrystallized grain has two growth interfaces and that the growth rate of each interface is the function of the kink-density of the interface. The anisotropy in growth rate of the grain boundary is determined by the interface which has a smaller kink-density than the other. Crystallographic orientation of the recrystallized grain grown in the deformed matrix is determined by the factor which contributes to an increase in the volume of the recrystallized grain. At the first

stage of the recrystallization growth, many random oriented small recrystallized grains contact with the deformed matrix. Only a few new grains, which have the largest growth rate grain boundary are capable of growing into the deformed matrix. The orientation relation is characterized by such recrystallized grains. So, grain boundaries which are constructed by [1123], [2243], and [1011] planes are also capable of similar growth rate. Effect of rotation around the pole of the grain boundary is considered and the misorientation relation is slightly dispersed. It is shown that relatively large scattering of the misorientation relation is caused by the effect of rotation around the pole of the grain boundary and rather small anisotropy of growth rate. The cause of the grain boundary facet evolved during the recrystallization growth is explained by the concept of 'growth form' of the recrystallized grain. E.A.K.

N83-22650# Hokkaido Univ., Sapporo (Japan).
REPEATED RECRYSTALLIZATION OF POLYCRYSTALLINE ICE **c76**
Maohuan Huang, Mutsumi Ohtomo, and Gorow Wakahama *In its* Low Temp. Sci., Ser. A.: Phys. Sci. 1982 p 13-23 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

A recrystallization experiment using a polycrystalline sample was conducted. Repeated processes of recrystallization play an important role in the formation process of preferred orientation of polycrystalline ice in the glacier. It was revealed by other experiments using a single crystal of ice that the crystallographic orientation relation between the c-axis of recrystallized grain and that of the deformed matrix is nearly 50 deg. The change of fabrics pattern of polycrystalline ice by reproducing the repeated recrystallization processes during the glacier flow was investigated. Data are obtained for crystallographic orientation, grain size distribution, misorientation angle between adjoining grains, and stress-strain curve. The c-axes of both specimen did not concentrate on a misorientation of 45 deg to the stress axis. It is considered that these patterns are caused by repeated recrystallization processes. It is suggested that in the distribution of crystallographic orientation of the specimens before recrystallization the formation mechanism of preferred orientation is important in the supply of the driving force and characterization the crystallographic orientation of a recrystallized grain. E.A.K.

N83-22651# Hokkaido Univ., Sapporo (Japan).
STUDIES OF THE BEHAVIOR OF A SNOW COVER ON A MOUNTAIN SLOPE. 5: EXAMPLES OF CURVES Ch AND Cv, RELATIONSHIP BETWEEN RATIO GAMMA OF PRINCIPAL STRAIN RATES AND RATIO GAMMA PRIME OF PRINCIPAL STRESSES **c43**
Zyungo Yosida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 25-42 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The behavior of mountain slope snow cover was studied. Curves C sub h and C sub v for use in a method for calculating two dimensional stresses from the strain rates actually measured within a snow cover lying on a mountain slop are defined. Horizontal coordinate x and vertical coordinate z are placed in the vertical plane parallel to which the snow cover flows down the slope two-dimensionally. The relationship between ratio gamma of principal strain rates and ratio gamma of principal stress is outlined. E.A.K.

N83-22652# Hokkaido Univ., Sapporo (Japan).
STUDIES OF THE BEHAVIOR OF A SNOW COVER ON A MOUNTAIN SLOPE. 11: POISSON'S RATIO OF SNOW, 1 **c43**
Mitsuo Ooizumi and Tosio Huzioka *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 43-53 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The Poisson's ratio upsilon of snow was measured. Both the vertical pressure P sub v and the lateral pressure P sub h in a snow cover on the ground by use of snow pressure gauges, taking the signs of P sub v and P sub h as negative were measured. For a snow cover on a mountain slope P was measured to obtain the magnitudes of three principal stresses, using values of upsilon P sub h and those strain rates of the three principal axes which are measured by another method. E.A.K.

N83-22653# Hokkaido Univ., Sapporo (Japan).
COLD AIR FLOW ON THE SNOW SURFACE **c47**
Shunichi Kobayashi and Nobuyoshi Ishikawa *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 55-64 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The wavy motion of cold air over the snow surface which was suggested from the observations of both mist layer taken up in the cold air and the phenomenon of pulsation of wind turbulence and temperature was investigated. Theoretical results agree well with the data obtained in field observations. The direction of cold air flow is obtained from rime ice observations and mist flow. E.A.K.

N83-22654# Hokkaido Univ., Sapporo (Japan).
THE SHAPE OF SNOW DRIFTS AND DISTRIBUTION OF WIND SPEED AROUND SNOW FENCES **c47**
Renji Naruse *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 65-73 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The surface shapes of snowdrifts formed around snow fences and distribution of wind speed over the fences and drifts in winters of 1980-1982 were measured. The studied fences are the horizontal slat fences with heights F(m) from 2.8 to 5.1 m, porosities of about 20% and bottom gaps from 0.09 F to 0.19 F. Distribution of flow lines of air was deduced on the basis of measurements of wind speed over a fence, the up wind drift and the lee wind drift. The effect of interaction between the height and porosity and bottom gap of the fence on the formation of effective drifts is emphasized. E.A.K.

N83-22655# Hokkaido Univ., Sapporo (Japan).
MICRO-PRESSURE WAVES NEAR THE SNOW SURFACE **c43**
Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 76-79 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Micropressure waves near the snow surface were observed using two micropressure difference sensors of the strain gauge type. A pressure passed through a fluid mechanical low pass filter was applied, as a reference pressure, at one inlet of one of the pressure sensor to remove fairly low frequencies and large amplitudes of the wave components. The propagation velocity of the pressure wave along the main wind direction was estimated from the lag time at the maximum value of cross correlation between two pressure waves at two points, 1 m apart, 0.5 m above the snow surface and was in agreement with the mean wind velocity. E.A.K.

N83-22656# Hokkaido Univ., Sapporo (Japan).
YEARLY VARIATION IN SNOW ACCUMULATION IN HOKKAIDO, JAPAN **c47**
Renji Naruse and Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 81-88 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The pattern of distribution of snow accumulation varied with the winters observed during 1978-1981. It is revealed that the prevailing weather condition of the individual winter control the pattern. The total precipitation accumulated during the season is described, though the difference between the dates when the two maximums occurred was observed from 0 to 46 days in Sapporo. The power spectrums are calculated using a series of data of 89 years and it is found that a dominant period of variation in maximum annual depth of snow is about 4 years at all the seven stations in Hokkaido. E.A.K.

N83-22657# Hokkaido Univ., Sapporo (Japan).
HARDNESS OF WET SNOW **c39**
Kaoru Izumi and Eizi Akitaya *In its* Low Temp. Sci., Ser. A:

Phys. Sci. 1982 p 89-97 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The mechanical properties of wet snow were investigated. Using samples of wet snow, measurements were made of Kinosita's hardness together with density and free water content. It is indicated that the relationship between Kinosita's hardness and dry density which is the density of wet snow without free water, that wet fine grained compact snow except the one flooded with water is harder than wet granular snow with the same density. It is found that in case of wet snow the dry density has a greater influence on hardness than on free water content. The time dependency of Kinosita's hardness of snow containing free water was examined in a cold room at 1 + or - 1 C. Snow samples used in experiments were granular snow and artificial snow. After a snow sample was supplied with water at 0 C to the extent of infiltrating sufficiently, hardness and free water content were measured at regular intervals as surplus water fell out from the snow sample. The following results were obtained: (1) when the free water content is maintained constantly after water supply, the hardness of granular snow is almost constant independent of time after its rapid decrease at the beginning; (2) in crushed snow hardness increases exponentially with time after its rapid change at the beginning. Initial hardness change is influenced by the annealing time before water supply. E.A.K.

N83-22658# Hokkaido Univ., Sapporo (Japan).
MELTING AT THE BOTTOM OF A SNOW COVER DURING THE WINTER IN AN AREA WITH VERY LOW TEMPERATURES AND DEEP SNOW. VARIATION IN MELTING RATE WITH TIME AND YEAR **c43**
Kenji Kojima *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 99-107 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Daily amounts of melting at the bottom of a snow cover during the winter and its variation from December to April were observed. Variations in the amount of daily bottom-melt during the first and second winters are shown. The amount varied largely with time during the early period of the first winter and reached nearly zero on January 20, 1981. The rate of bottom-melt in the second winter was found to be much greater than that in the first winter especially in January. It decreased gradually from the largest value in the first stage of the winter and reached the minimum in Feburary increasing again toward the melting season. The flux in the second and first winters is shown. It was found that the monthly average of daily bottom-melt was in a range of approximately 0.37 to 1.04 mm times d to the -1 for the second winter and approximately 0.26 to 0.78 mm times d to the -1 for the first winter. Estimation of the rate of bottom-melt during the period of heavy surface melting is estimated only by heat flow observations. The monthly averages for April 1 to 30 in both years were about 0.5 mm times d to the -1, which may be approximately equal to the seasonal average under normal conditions in the test area. E.A.K.

N83-22659# Hokkaido Univ., Sapporo (Japan).
MEASUREMENT OF SENSIBLE HEAT FLUX IN THE SNOW-MELTING SEASON, 1 **c43**
Nobuyoshi Ishikawa and Shunichi Kobayashi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 109-116 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The wind velocity and the temperature difference at two heights above the snow surface were measured. This is called the bulk method. Values of K obtained by many investigators converge around approximately 0.3 to 0.4 using one hour mean values of delta T and V. The sensible heat flux (Q sub 1) is measured directly by using the ultrasonic anemothermometer - the eddy correlation method. The measurements of sensible heat flux are carried out by using three different methods, bulk, correlation and heat amount of snow-melt. Time variations in sensible heat flux were investigated, and Q sub 2 were compared with Q sub 1 to decide the empirical constant K. The following results are obtained: (1) remarkable time variations in sensible heat flux show the maximum and the minimum in the daytime and at night; (2) the daytime values of K are around 0.26 regardless of the stability ratio; and (3) the values of K at night are scattered widely in the region of the high stability ratio. E.A.K.

N83-22660# Hokkaido Univ., Sapporo (Japan).
A CONTINUOUS MEASURING SYSTEM OF WATER CONTENT IN CLOUD AND FOG BY MEANS OF A MICROCOMPUTER **c47**
Tatsuo Endoh, Hiroyuki Konishi, and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 117-128 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The design and testing of a technique for acquiring continuous measurements of liquid water content in fog and clouds is discussed. The method is based on the coupling of temperature and humidity sensors to a microcomputer, the principle being that they are obtainable from a difference between the vapor density of subsaturated air, which is produced from sampled air by means of heating and evaporating, and the saturation vapor density at the initial air temperature. To eliminate the problem arising from a difference in response time of individual elements of the sensoring component several tests were carried out in the laboratory by calculating the total water content instead of the liquid water content. Furthermore, a field test was conducted for natural sea fog at a site on the Pacific Ocean side of the eastern Hokkaido. Finally, a conventional method was tested which avoided the sensor problem in deducing a liquid water content from a humidity value alone under constant temperature, using the negative feedback coupled to the microcomputer. M.G.

N83-22661# Hokkaido Univ., Sapporo (Japan).
STEREOSCOPIC ANALYSES OF CLOUD PATTERNS IN WINTER MONSOON BY SHORT INTERVAL OBSERVATIONS USING GMS-1 **c47**
Tatsuo Endow, Gorow Wakahama, Shinri Irikawa, Kunihiko Hozumi, and Toshihiro Motoki *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 129-142 refs (For primary document see N83-22648 12-70)
Avail: NTIS HC A11/MF A01

During specially designed observations two series of successive pictures were taken at a short interval of seven minutes by GMS-1 in the winter of 1980 to 1981; they were analyzed stereoscopically by means of Cameron's method, which provided the difference in relative velocity of individual clouds. It was possible to estimate the height of a cloud by comparison between the velocity of the cloud obtained by the stereoscopic analyses and the velocity of wind obtained by the sounding data, since the velocity of wind aloft almost always increased with an increase in height during the observations. It was noted in every case that a notable cloud system grew and aligned itself in an intermediate scale from the base of the Korean Peninsula to the west coast of the Japanese Islands, which is referred to as a cloud convergence zone of the Sea of Japan or a V-shaped cloud pattern. Within the confines of this convergence zone a large number of cloud rows were observed in a transverse mode, where the velocities and the heights of clouds were seen lower than those of other areas. Numerous cloud bands were also observed to the northward area from the zone in a longitudinal mode, where the velocities and the heights of clouds were seen highest. To the southward area of the convergence zone, a large number of open-cell clouds were observed to align themselves in a longitudinal mode in the upstream part, which began meandering mosaically in the downstream part, where the velocities and the heights of clouds were moderately higher than those in the convergence zone. M.G.

N83-22662# Hokkaido Univ., Sapporo (Japan).
ANALYSIS AND CHARACTERISTICS OF CORES FROM A MASSIVE ICE BODY IN MACKENZIE DELTA, N.W.T., CANADA **c43**
Kazuo Fujino, Kaoru Horiguchi, Kunio Shinbori, and Kikuo Kato *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 143-150 refs (For primary document see N83-22648 12-42)

Avail: NTIS HC A11/MF A01

Using a newly designed electro-mechanical drill, core samples were obtained successfully throughout a massive ice body near Tuktoyaktuk, Mackenzie Delta. Obtained cores, about 23 m in total length, were investigated systematically concerning crystallography together with analyses of chemical components such as oxygen isotopes, pH, and salinity. Many band-like structures divided by soil layers were observed in the entire length of the cores. The inclination and the thickness of each stratum were not uniform. Crystals in the strata were clearly different between two adjacent strata in size, shape, and c-axes orientation and also in distribution of air bubbles. Obtained results strongly suggest that the massive ice body was formed by congelation of water, being supported by the presence of band-like structure, dispersed soils, and elongated air bubbles. M.G.

N83-22663# Hokkaido Univ., Sapporo (Japan).
CORRELATION BETWEEN SHAPE AND CRYSTALLOGRAPHIC AXES OF SINGLE CRYSTALS IN GLACIER ICES **c43**
Mutsumi Ohtomo and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 151-158 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Studies were made of a correlation between the crystallographic axes and shape of an individual single crystal of a crystalline aggregate, using two samples, which had a typical fabrics pattern of the four-maxima type, one from Mendenhall Glacier, Alaska, U.S.A. and the other a boring core at a depth of 324 m of Cape Folger, Antarctica. The individual grain of the crystalline aggregate was approximated to an ellipsoid, then the length of three axes of the ellipsoid were measured. The samples had a flattened and elongated form. Mean axial ratio (R) was 0.31 for the Mendenhall Glacier ice, and 0.46 for the Cape Folger boring core. Crystallographic axes of the single crystal were determined by the method of optical reflection utilizing a piece of hoar condensed on the surface of the crystal, or by X-ray Laue photography. The result shows that the crystallographic axes correlated in most cases with the axes of the ellipsoid, that is, the longest and the shortest axis of the ellipsoid are coincident with one of the a-axes and the c-axis of a crystal respectively. Samples were also analyzed by the stereological method. No sign of linear oriented structure was given from either sample. The Mendenhall Glacier sample showed almost isometric structure and the Cape Folger sample indicated a planar oriented structure. If the correlation is originated by the effect of glacier flow, it is strongly supposed that the results of the stereological analysis show a linear oriented structure. Consequently, it is considered that the factor in determining the shape of the individual crystal of a glacier is not glacial flow but anisotropy in growth rate. M.G.

N83-22664# Hokkaido Univ., Sapporo (Japan).
SNOW LAYER ON SEA ICE **c43**
Takatoshi Takizawa and Masaaki Wakatsuchi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 159-165 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Field experiments were conducted to investigate the characteristics of the snow layer on sea ice at Lake Saroma in Hokkaido. By removing ice blocks from the fast ice sheet a thickness of about 27 cm, three rectangular test pools were made. When newly formed ice in the pools grew to a thickness of several centimeters, it snowed with a fall of about 2 cm. The brine which was pushed out to the ice surface flooded the snow layer; then the snow became slush-like. The salinities of snow layers were as high as about 33. On the day after it stopped snowing, the snow salinities were found to have decreased by about 10. Subsequently the salinities decreased little, with a tendency to settle down to a constant value of about 20, which was almost two times that of the ice beneath the snow. Snow samples were collected at several stations on the fast ice sheet. The snow was wet and had salinities from 23.5 to 36.9. These values were similar to those of snow layers covering the pools. On the other hand, the snow layer on a refreezing crack was dry and had a salinity of 9.9. It is considered that this snow layer was formed by the deposition of drifting snow after the ice in the crack grew up to young ice. Further, new snow falling on the bare fast ice surface was also dry and had a salinity of about 10. M.G.

N83-22665# Hokkaido Univ., Sapporo (Japan).
SALINITY PROFILES OF NEWLY GROWN SEA ICE **c43**
Masaaki Wakatsuchi and Takatoshi Takizawa *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 167-172 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Field experiments were carried out to observe the salinity profiles of sea ice which was newly grown in artificial pools in a fast ice sheet of Lake Saroma. When the new ice grew to a thickness of several centimeters, it snowed with a fall of about 2 cm on the ice surface. Upon removal of the snow layer in one pool immediately after the snowfall a marked difference was observed in salinity profile between ices covered and not covered with snow. The snow covered ice continued to have a higher salinity in the surface layer and the minimum salinity in the underlying intermediate layer during the growing period. The formation of the surface layer with the relatively high salinity was due to the existence of surface brine. Meanwhile in the ice not covered with snow, no such layers existed because most of the surface brine was removed together with the snow and the resulting higher temperature gradient of ice was followed by the migration of brine pockets within the surface layer toward the intermediate layer. The upward migration of brine within the ice was limited during the initial freezing period, even in the present thinner ice. In spite of the marked difference in the ice salinity profile, the average ice salinities were close to each other during the growing period. In the ice not covered with snow, the salt loss due to the removal of the surface brine was compensated by subsequent salinity increases due to the relatively increased ice growth rate. Meanwhile in the snow covered ice, relative salinity decreases under lower ice growth rates were compensated by the gain of some salt from the snow including saline water. M.G.

N83-22666# Hokkaido Univ., Sapporo (Japan).
MEASUREMENTS OF CRYSTALLOGRAPHIC ORIENTATIONS OF SEA ICE **c43**
Toshiyuki Kawamura *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 173-178 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The c-axis and a-axis orientations of sea ice were measured by means of X-ray Laue photography. Newly grown ice on an artificial pool in Lake Saroma and the bottom part of antarctic sea ice were examined. A freshly grown sea ice block in Lake Saroma, 5.3 cm thick, was sliced horizontally at every 1 cm depth. The orientations of grains on each horizontal thin section were measured and the grains were followed as to how their shape and size changed with the depths. The average inclination of the c-axis to the vertical direction increases with growth as shown on a standard Wulff projection net. C-axes of grains in Lake Saroma ice direct randomly in the horizontal plane, but an antarctic sea ice sample exhibits strong c-axis alignment within that plane. It seems that the angle between the a-axis and the vertical direction has a maximum distribution around 60 degrees in the antarctic sample, whereas it distributes randomly in the lower layer of Lake Saroma samples. It is found that, in the Lake Saroma samples, the distribution of the angle between c-axes of neighboring grains has a broad peak around 60 degrees and that neighboring grains with a small angle increase with depth. In antarctic ice, the small angle is predominant as a result of strong c-axis alignment and a-axis misorientation also has a tendency to make small angles. Grains with preferred orientation encroach other grains in several forms which are often combined. It seems that which grain is preferable depends not only on the relation between the orientations but also on the state of contact with neighboring grains.
M.G.

N83-22667# Hokkaido Univ., Sapporo (Japan).
SHORT-TERM VARIATIONS IN HEAT BUDGET WITH THE GROWTH OF SEA ICE, 1 **c43**
Nobuyoshi Ishikawa and Shunichi Kobayashi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 178-189 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Time variations in heat budget with the growth of sea ice measured at the artificial pools (3x3 m) were obtained. The surface temperature of the pool was much higher than the air temperature during the period in which the thickness of the sea ice was thin. It resulted in a large amount of outgoing longwave radiation and the negative values of sensible heat flux at night. On the other hand, a large amount of incoming net radiation was obtained in the daytime because of the low surface albedo of thin sea ice, and the value of sensible heat flux had both signs (negative and positive) according to the temperature gradients above the surface. Evaporation always took place on the surface in the daytime and at night. The difference in surface temperature between the bare ice and the pool, and also differences of each component of the heat budget between these two different sites were large in the period of thin sea ice, respectively, and they reduced to small values in proportion to an increase in sea ice thickness. The amount of net radiation played the most important role among the heat budget components for the growth of sea ice. Heat supply from the underlying water to the lower boundary of sea ice was calculated as the residual term of heat budget equation. The mean value was estimated as 0.051 ly/min, which was not so small as compared with other budget components. M.G.

N83-22668# Hokkaido Univ., Sapporo (Japan).
OBSERVATIONS OF RADAR ECHO PROPAGATED ON A SEA-ICE FIELD **c32**
Masayuki Oi, Hiroki Fukushi, and Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 191-198 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Intensities of the radar echo change remarkably hour by hour or day by day during the existence of sea ice off the Okhotsk Sea coast of Hokkaido. One of the causes for the change in radar echo intensity is a change of a propagative channel for radar waves, as the meteorological conditions change. In order to verify this frequency distributions of K, the effective Earth's radius factor, were obtained corresponding to the change in the maximum observable area, by analyzing the daily weather reports (rawinsonde data). It was understood that the maximum observable area depended upon the change in K. Moreover, it was found that this change depended also upon the anomalous propagation, which is a phenomenon characteristic of the sea ice field. M.G.

N83-22669# Hokkaido Univ., Sapporo (Japan).
COLD WATER MASSES APPEARED IN THE OKHOTSK SEA NEAR HOKKAIDO IN SUMMER **c48**
Tatsuo Motoi, Nobuo Ono, and Masaaki Aota *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 199-206 refs (For primary document see N83-22648 12-70)
Avail: NTIS HC A11/MF A01

The Okhotsk Sea is marked by the presence of three waters, the Soya Warm Water, the Okhotsk Low Salinity Water and the Intermediate Cold Water, near Hokkaido. Oceanographic observations were carried out in an area within 30 nautical miles of the coast of Hokkaido from July 24 to 31 and from August 26 to September 3, in 1981. In the first period a time series of temperature, salinity, current speed and direction was measured by using the Aanderaa current meter which was moored at a point 20 nautical miles off Monbetsu at a depth of 50 m. This position was situated between the Soya Warm Water and the Intermediate Cold Water. The data obtained indicated that during the observed period the Soya Warm Water or the Intermediate Cold Water appeared. However, the data also showed that water masses apparently different from the above two waters were present on July 25 and 26 and that, despite marked differences in temperature and salinity, they had nearly the same density as the above two waters. During the second period hydrographic sections were obtained for closely spaced stations, which indicated that cold water masses existed inside of the Soya Warm Water. M.G.

N83-22670# Hokkaido Univ., Sapporo (Japan).
ON OCEANIC STRUCTURE OF A FRONTAL REGION OF SOYA WARM CURRENT, PRELIMINARY REPORT **c48**
Masaaki Aota *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 207-215 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

The coastal region of the Southwestern Okhotsk Sea constitutes a front where three typical water masses (Soya Warm Current Water; Low Salinity Surface Water; Intermediate Water) meet each other and exhibit a complicated oceanic structure. A conspicuous appearance of an isolated cold pool of water has been noted in the Soya Warm Current in warmer seasons. Observations were carried out along the direction parallel to the shore off the northeast of Monetsu harbor in an effort to study this oceanic frontal condition in detail in the subsurface layer 1 to 2 m in thickness. From the variation in vertical temperature section it was found that the cold of water has a sheet like shape 20 to 50 m thick, 14 to 15 km wide, 55 km long, and drifted along the shore during the time of observations. The vertical profiles of temperature and salinity were observed in the region where the cold pool of water existed and in the frontal region between the Soya Warm Current and Intermediate Water Mass by free falling CTD observations. The facts suggest that this fine subsurface structure of temperature, salinity and density were associated with active interleaving or double diffusion or both between the Soya Warm Current Water and the surrounding water mass and that the isolated cold pool of water in the Soya Warm Current originated in the Intermediate Water Mass. M.G.

N83-22671# Hokkaido Univ., Sapporo (Japan).
PORE-WATER PRESSURE PROFILE IN FREEZING POROUS ROCKS **c46**
Masami Fukuda and Tomokazu Matsuoka *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 217-224 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

Pore water pressure profiles were obtained from measurements by means of tensiometers, using a porous rock sample with an effective porosity of 36% and in a cylindrical shape 5 cm in diameter and 15 cm height. The pore water pressure increased as the freezing front descended. Then the freezing front was at a short distance from the porous cup, the pore water pressures rose and then dropped sharply due to the entry of air through the porous cup wall. An increase in pore water pressure corresponded to a decrease in water content. In order to estimate the flow rate of water to the freezing front through the texture of the unfrozen rock sample, hyraulic gradients between the depths of 3 and 5 cm were calculated from pore water pressures measured during the freezing. As freezing began, the total potential gradient increased sharply. When the pore water pressure at the 3 cm depth reached a maximum the potential gradient increased. The maximum potential gradients of each initial condition were selected with the mean pore water pressures at each depth. A simple regression having an exponential form was performed. It is concluded that the pore water pressure measurements in unfrozen porous rocks can be used to indicate the maximum pore water pressure causing the movement of water to the freezing front; and that the shattering of porous rocks is due not to in situ freezing of water but such migration of water as moves to freezing front. M.G.

N83-22672# New Mexico Energy and Minerals Dept., Santa Fe. Energy and Minerals Dept.
ENERGY RESOURCES IN NEW MEXICO: OIL AND GAS, COAL, ELECTRICAL GENERATION, URANIUM, AND GEOTHERMAL ENERGY Annual Resources Report
1982 98 p refs
(DE83-900485; NP-3900485) Avail: NTIS HC A05/MF A01

The resource data of New Mexico (oil and gas, coal, electrical

generation, uranium, and geothermal) were surveyed and reviewed. Each resource area was further described by means of production, reserves, prices, consumption, transportation, employment, and revenue statistics over the past ten years. For individual titles, see N83-22673 through N83-22678.

N83-22673# New Mexico Energy and Minerals Dept., Santa Fe.
ROLE OF ENERGY RESOURCES IN NEW MEXICO **c43**
In its Energy Resources in New Mexico 1982 p 13-16 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

The development of energy resources, particularly oil and gas, has contributed a major share of New Mexico's revenues and provided a predominant component of the economic base. The dependency of the development of what was considered abundant resources was the basis for economic growth and stability. This dependency may be disruptive to the future economic stability, and if a diversification of the economy does not take place, the state may be in danger of approaching the future without a strong economic base. B.G.

N83-22674# New Mexico Energy and Minerals Dept., Santa Fe.
OIL AND GAS **c43**
In its Energy Resources in New Mexico 1982 p 17-36 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

New Mexico's crude oil and natural gas reserve base was never fully identified. Variation was due to the methods used for calculation, differing geological and engineering approaches in assuming recovery, and agency reporting. Assessment of the reserve base was determined by adding a conservative estimate of gas available from infill drilling on developed acreage as well as adding conservative estimates of gas available in undeveloped acreage. B.G.

N83-22675# New Mexico Energy and Minerals Dept., Santa Fe.
COAL **c43**
In its Energy Resources in New Mexico 1982 p 37-46 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

Coal production occurs in only two basins-the San Juan and Raton Basins. The most significant coal-bearing formations are found in the San Juan Basin (where more than 90 percent of New Mexico's coal is produced). The quality of coal ranges from high-heat content, coking-quality bituminous coal to non-coking, lower rank subbituminous coal. In addition, the coal is generally low in sulfur content, with wide variations in ash and moisture content from field to field. B.G.

N83-22676# New Mexico Energy and Minerals Dept., Santa Fe.
ELECTRICAL GENERATION **c44**
In its Energy Resources in New Mexico 1982 p 47-59 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

Although electricity is not a natural resource in the sense of coal or oil and gas, the electric utility industry is an integral part of the energy sector of the economy. Electricity is derived by converting one type of energy resource (oil, gas, coal, uranium) into a usable energy form (electricity) and thus has unique properties as a source of energy for the end user. Electrical energy, however, is not only important to New Mexico because electric utilities consume a portion of the natural gas and a large portion of coal resources extracted in the state, but also because electricity affects industrial growth in both the energy and non-energy sectors of the state's economy. B.G.

N83-22677# New Mexico Energy and Minerals Dept., Santa Fe.
URANIUM **c43**
In its Energy Resources in New Mexico 1982 p 60-78 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

Reserves are uranium resources which occur in known deposits of such grade, quality, configuration, and depth that they are recovered at a cost less than an equal or fixed value through the use of the state of the art mining and processing technologies. Uranium reserves are classified according to categories based on the maximum cost required to extract a pound of uranium concentrate (U308). Uranium mines and mill capacity were also discussed. B.G.

N83-22678# New Mexico Energy and Minerals Dept., Santa Fe.
GEOTHERMAL **c44**
In its Energy Resources in New Mexico 1982 p 77-96 refs (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

New Mexico's geothermal resource potential, as exhibited in more than 300 known thermal springs and wells, exists primarily in association with Quaternary faulting, such as along the Rio Grande rift, or in association with Quarternary volcanic activity. Detailed areas and sites of geothermal prospects having potential for both electrical and thermal uses are listed. Considerable amounts of geological, hydrological, electrical resistivity, gravity, magnetic, seismic, water and subsurface temperature data have been compiled and analyzed. B.G.

N83-22679# Pacific Northwest Lab., Richland, Wash.
TECHNOLOGY DEMONSTRATION GEOSTATISTICAL AND HYDROLOGIC ANALYSIS OF SALT AREAS. ASSESSMENT OF EFFECTIVENESS OF GEOLOGIC ISOLATION SYSTEMS
P. G. Doctor, P. L. Oberlander, W. A. Rice, J. L. Devary, R. W. Nelson, and P. E. Tucker Sep. 1982 115 p refs
(Contract DE-AC06-76RL-01830)
(DE83-000888; PNL-4129) Avail: NTIS HC A06/MF A01

The Office of Nuclear Waste Isolation (ONWI) requested Pacific Northwest Laboratory (PNL) to: (1) use geostatistical analyses to evaluate the adequacy of hydrologic data from three salt regions, each of which contains a potential nuclear waste repository site; and (2) demonstrate a methodology that allows quantification of the value of additional data collection. The three regions examined are the Paradox Basin in Utah, the Permian Basin in Texas, and the Mississippi Study Area. Additional and new data became available to ONWI during and following these analyses; therefore, this report must be considered a methodology demonstration here would apply as illustrated had the complete data sets been available. A combination of geostatistical and hydrologic analyses was used for this demonstration. Geostatistical analyses provided an optimal estimate of the potentiometric surface from the available data, a measure of the uncertainty of that estimate, and a means for selecting and evaluating the location of future data. DOE

N83-22680# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES, NO. 24
1 Feb. 1983 63 p Transl. into ENGLISH from various Russian articles
(JPRS-82772) Avail: NTIS HC A04

Abstracts of formal scientific reports and news items on Soviet research in the earth sciences, including meteorology, oceanology, and geophysics. Information on current Arctic and Antarctic expeditions is also provided. For individual titles, see N83-22681 through N83-22684.

N83-22681# Joint Publications Research Service, Arlington, Va.
RESULTS AND PROSPECTS OF COOPERATIVE OCEANOLOGICAL RESEARCH **c48**
Andrey Aksenov *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 12-16 Transl. into ENGLISH from Ekon. Sotrudnichestvo Stran-Chlenov Sev (USSR), no. 7, Jul. 1982 p 6-10 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

The formulation of measures for the preservation of the environment, investigation of the seas and oceans for the purpose of using their mineral resources, and study of the chemical, physical, biological and other processes of the most important regions in the world ocean are addressed. Author

N83-22682# Joint Publications Research Service, Arlington, Va.
SYSTEM FOR MARINE GEOPHYSICAL SURVEY **c48**
V. Ilichev and A. Yanshin *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 17-19 Transl. into ENGLISH from Pravda (Moscow), 2 Oct. 1982 p 2 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

The creative cooperation of Soviet and Hungarian scientists made it possible to design and introduce a highly productive marine automated on-board navigational-geophysical complex with the use of satellite navigation on the scientific research ships of the USSR Ministry of Geology, USSR Academy of Sciences and USSR Ministry of Health. This complex is called the "MARS". Author

N83-22683# Joint Publications Research Service, Arlington, Va.
GEOPHYSICAL METHODS IN OIL AND GAS PROSPECTING **c46**
In its USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 33-35 Transl. into ENGLISH from Pravda (Moscow), 4 Aug. 1982 p 2 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

The physical principles of the methods and techniques for sounding the zone around the borehole with a flux either of neutrons or acoustic energy in a relatively broad band of intensities and frequencies are developed. Author

N83-22684# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON MASSA EXPERIMENT **c46**
A. Gorokhov *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 36-38 Transl. into ENGLISH from Pravda (Moscow), 30 Nov. 1982 p 6 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

A multisided experiment for exciting the Earth's ionosphere and magnetosphere by means of a surface explosion of moderate intensity. The experiment, in whose implementation 15 Soviet scientific research organizations participated, was carried out within the framework of the so-called MASSA program. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N83-22685* National Aeronautics and Space Administration, Washington, D. C.
RESEARCH AND TECHNOLOGY: REPORT, FY 1982 Annual Report
8 Mar. 1983 76 p refs Original contains color illustrations
(NASA-TM-85175; NAS 1.15:85175) Avail: NTIS HC A05 CSCL 05B

Sensor systems, data analysis programs, agriculture and resources inventory survey through aerospace remote sensing (AgRISTARS), applied research and data analysis, joint research project, and testing and evaluation are reported. Author

N83-22686*# General Electric Co., Philadelphia, Pa. Space Center.
AN OVERVIEW OF THE THEMATIC MAPPER GEOMETRIC CORRECTION SYSTEM
Eric P. Beyer [1983] 89 p ERTS
(Contract NAS5-25300)
(E83-10206; NASA-CR-170052; NAS 1.26:170052) Avail: NTIS HC A05/MF A01 CSCL 08B

Geometric accuracy specifications for LANDSAT 4 are reviewed and the processing concepts which form the basis of NASA's thematic mapper geometric correction system are summarized for both the flight and ground segments. The flight segment includes the thematic mapper instrument, attitude measurement devices, attitude control, and ephemeris processing. For geometric correction the ground segment uses mirror scan correction data, payload correction data, and control point information to determine where TM detector samples fall on output map projection systems. Then the raw imagery is reformatted and resampled to produce image samples on a selected output projection grid system. A.R.H.

N83-22687*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MONITORING STRIP MINING AND RECLAMATION WITH LANDSAT DATA IN BELMONT COUNTY, OHIO
Ronald G. Witt, G. M. Schaal, and B. G. Bly Mar. 1983 23 p refs ERTS
(E83-10209; NASA-TM-85001; NAS 1.15:85001) Avail: NTIS HC A02/MF A01 CSCL 08B

The utility of LANDSAT digital data for mapping and monitoring surface mines in Belmont County, Ohio was investigated. Two data sets from 1976 and 1979 were processed to classify level 1 land covers and three strip mine categories in order to examine change over time and assess reclamation efforts. The two classifications were compared with aerial photographs. Results of the accuracy assessment show that both classifications are approximately 86 per cent correct, and that surface mine change detection (date-to-date comparison) is facilitated by the digital format of LANDSAT data. A.R.H.

N83-22688*# Minnesota Univ., St. Paul. Remote Sensing Lab.
INTEGRATION OF ENVIRONMENTAL AND SPECTRAL DATA FOR SUNFLOWER STRESS DETERMINATION Final Report, 24 Aug. 1981 - 30 Sep. 1982
Thomas Lillesand and Mark Seeley 31 Jan. 1983 60 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-16427)
(E83-10211; NASA-CR-167834; NAS 1.26:167834; Rept-0663-5551) Avail: NTIS HC A04/MF A01 CSCL 02C

Stress in sunflowers was assessed in western and northwestern Minnesota. Weekly ground observations (acquired in 1980 and 1981) were analyzed in concert with large scale aerial photography and concurrent LANDSAT data. Using multidate supervised and unsupervised classification procedures, it was found that all crops grown in association with sunflowers in the study area are spectrally separable from one another. Under conditions of extreme drought, severely stressed plants were differentiable from those not severely stressed, but between-crop separation was not possible. Initial regression analyses to estimate sunflower seed yield showed a sensitivity to environmental stress during the flowering and seed development stages. One of the most important biological factors related to sunflower production in the Red River Valley area was found to be the extent and severity of insect infestations. A.R.H.

N83-22689*# GeoScience Research Corp., Salisbury, Md.
ICE SHEET SURFACE FEATURES IN SOUTHWESTERN GREENLAND FROM SATELLITE RADIO ALTIMETRY
Ronald L. Brooks and George A. Norcross May 1982 27 p refs
(Contract NAS6-3232)
(NASA-CR-156887; NAS 1.26:156887) Avail: NTIS HC A03/MF A01 CSCL 08L

Fourteen SEASAT and ten GEOS-3 satellite radar altimeter groundtracks across a 1 deg x 2.5 deg study area in southwestern Greenland have yielded 3,328 ice sheet surface elevations. The surface elevations derived from SEASAT were recalculated based on a waveform retracking algorithm. The elevations have been utilized to develop a surface profile, a three dimensional surface representation, and surface contours. Analysis of the elevations reveals the presence of surface terraces, some greater than 100 km in length; each terrace is at a discrete elevation. Renormalized SEASAT AGC values are shown to be correlated with the surface slope. The ice surface undulations caused frequent altimeter losses-of-lock. Future satellite radar altimeters could significantly contribute to ice sheet mapping in the next decade, particularly if they incorporate tracking systems with more frequent updates. Author

N83-22690# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THE EFFECTS OF A TROPICAL RAIN FOREST COVER ON AIRBORNE GAMMA RAY SPECTROMETRY

Enio B. Pereira and Daniel J. R. Nordemann Mar. 1983 36 p refs Submitted for publication Sponsored by Fundo Nacional de Desenvolvimento Cinetifico e Tecnologico

(INPE-2665-PRE/275) Avail: NTIS HC A03/MF A01

A simple experiment is made to demonstrate the strong influence of the forest biomass on the soil gamma photons measured at low altitudes. Next, theoretical calculations are made to estimate the effects of attenuation and generation of gamma photons by a tropical rain forest environment. For typical flight altitudes of 100 meters, it is shown that a 35 meter high canopy can attenuate from 40% to 60% of the original gamma photons, depending on the energy considered. It is also shown that the 1.46 MeV photopeak of 40-K measured at flight altitudes is completely dominated by the forest generated component, while this effect is probably negligible for the 2.62 MeV of 108-Tl and the 1.76 MeV of 214-Bi. Of major importance are the effects of forest clearings on the gamma-ray spectrum, which can lead to serious misinterpretations of aerial profile data if not taken into account. Besides the theoretical evaluation of these and other effects from the viewpoint of applied airborne gamma-ray spectrometry, a short review on the biocycles of potassium from the soil to the biomass of the tropical rain forest is also presented. Author

N83-22691# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A MODEL FOR ESTIMATING CORN YIELD APPLIED TO SAO PAULO STATE M.S. Thesis [UM MODELO PARA ESTIMACAO DO RENDIMENTO DO MILHO APLICADO AO ESTADO DE SAO PAULO]

Walter Celaschi Mar. 1983 169 p refs In PORTUGUESE; ENGLISH summary

(INPE-2658-TDL/118) Avail: NTIS HC A08/MF A01

Regression type crop yield models for corn were developed. A methodology for selecting the meteorological variables that go into the regression equation was introduced. This methodology, called here the 'critical periods method' uses meteorological daily data and is able to extract, out of the agrometeorological time series (annual yields and precipitation and temperature daily data) information concerning the behavior of an average phenological cycle for the crop area under study. Monthly means models were also developed for comparison with the critical periods models. The results presented show the critical periods models to be superior to the monthly means models. The errors are smaller, the coefficients more stable and they do not present problems of multicolinearity. S.L.

N83-22692# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

REMOTE SENSING TECHNIQUES AID IN PREATTACK PLANNING FOR FIRE MANAGEMENT

Lucy Anne Salazar Sep. 1982 25 p refs Prepared in cooperation with Humboldt State Univ., Arcata, Calif.

(PSW-162) Avail: NTIS HC A02/MF A01

A basic preattack plan that included fuel types, road systems, and water sources was developed for 25,288 acres (10,234 ha) of the Six Rivers National Forest in northwestern California. Digital data recorded by LANDSAT were computer analyzed through unsupervised and guided clustering classification techniques to produce a preattack fuel type map of the area. Aerial photography and ground truth data were used to support the satellite information. Access routes and water sources were delineated through visual interpretation of small- (1:130,000) and medium-scale (1:31,284) color-infrared (CIR) photography taken from U-2 jet aircraft. The final product was a series of mylar overlays with a 7 1/2-minute topographic quad used as a base map. A cluster sampling method evaluated LANDSAT classification accuracy. Photointerpretation determined the true land cover category. A.R.H.

N83-22693*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SPATIAL VARIATION OF CORN CANOPY TEMPERATURE AS DEPENDENT UPON SOIL TEXTURE AND CROP ROOTING CHARACTERISTICS

B. J. Choudhury Feb. 1983 36 p refs

(NASA-TM-84981; NAS 1.15:84981) Avail: NTIS HC A03/MF A01 CSCL 02C

A soil plant atmosphere model for corn (Zea mays L.) together with the scaling theory for soil hydraulic heterogeneity are used to study the sensitivity of spatial variation of canopy temperature to field averaged soil texture and crop rooting characteristics. The soil plant atmosphere model explicitly solves a continuity equation for water flux resulting from root water uptake, changes in plant water storage and transpirational flux. Dynamical equations for root zone soil water potential and the plant water storage models the progressive drying of soil, and day time dehydration and night time hydration of the crop. The statistic of scaling parameter which describes the spatial variation of soil hydraulic conductivity and matric potential is assumed to be independent of soil texture class. The field averaged soil hydraulic characteristics are chosen to be representative of loamy sand and clay loam soils. Two rooting characteristics are chosen, one shallow and the other deep rooted. The simulation shows that the range of canopy temperatures in the clayey soil is less than 1K, but for the sandy soil the range is about 2.5 and 5.0 K, respectively, for the shallow and deep rooted crops. Author

N83-22694*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SIMULATING SPATIAL AND TEMPORAL VARIATION OF CORN CANOPY TEMPERATURE DURING AN IRRIGATION CYCLE

B. J. Choudhury and C. A. Federer (Northeastern Forest Experiment Station, Durham, N.H.) Feb. 1983 41 p refs Submitted for publication

(NASA-TM-84991; NAS 1.15:84991) Avail: NTIS HC A03/MF A01 CSCL 02C

The canopy air temperature difference (delta T) which provides an index for scheduling irrigation was examined. The Monteith transpiration equation was combined with both uptake from a single layered root zone and change in internal storage of the plant and the continuity equation for water flux in the soil plant atmosphere system was solved. The model indicates that both daily total transpiration and soil induced depression of plant water potential may be inferred from mid-day delta T. It is suggested that for the soil plant weather data used in the simulation, either a mid day spatial variability of about 0.8K in canopy temperatures or a field averaged delta T of 2 to 4K may be a suitable criterion for irrigation scheduling. E.A.K.

N83-22695# Washington Univ., Seattle. Coll. of Forest Resources.

IMPACT OF WATER LEVEL CHANGES ON WOODY RIPARIAN AND WETLAND COMMUNITIES. VOLUME 10: INDEX AND ADDENDUM TO VOLUMES 1-8 Final Report

Roberta J. Chapman, Thomas M. Hinckley, and Lyndon C. Lee Jul. 1982 122 p refs

(Contract DI-14-16-0009-953)

(PB83-128132; FWS-OBS-82/23-Vol-10) Avail: NTIS HC A06/MF A01 CSCL 06C

This volume provides users with an updated literature review and corrections for volumes 1 through 8 in the series entitled 'Impact of Water Level Changes on Woody Riparian and Wetland Communities.' Through a comprehensive index, this volume also provides readers with a quick reference and, therefore, a more efficient use of the earlier volumes. This volume also contains a section on site rehabilitation. This section discusses how to identify or rehabilitate damaged or altered wetland and riparian ecosystems and how to identify and manage processes occurring within these systems. Author (GRA)

N83-22696# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

BIBLIOGRAPHY OF LITERATURE ON CHINA'S GLACIERS AND PERMAFROST. PART 1: 1938 - 1979
Shen Jian and Zhang Xianggong Sep. 1982 54 p
(AD-A122399; CRREL-SR-82-20-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 08/12

This report is a translation of a book received by USACRREL as part of its cooperative program with the Institute of Glaciology and Cryopedology, Academica Sinica, People's Republic of China. The bibliography covers the following topics: glaciers by geographic regions, applied glaciology including snow, avalanches, and river ice, permafrost (cryopedology), mud flows, and survey techniques including mapping, remote sensing, and isotope analyses. A list of Chinese journals is included. Author (GRA)

N83-22697# Kansas Univ., Lawrence.
ASSESSMENT OF THE GEOTHERMAL RESOURCES OF KANSAS. VOLUME 2: APPENDICES, SECTION 3
Jun. 1982 90 p 2 Vol.
(Contract DE-AS07-79ET-27204)
(DE83-003222; DOE/ET-27207/T1-Vol-2-Sect-3) Avail: NTIS HC A05/MF A01

Regression analyses of thermal gradients computed for 1980 and 1981 with respect to unconsolidated sediments and with respect to water tables in Kansas are given. DOE

N83-22698# Kansas Univ., Lawrence.
ASSESSMENT OF THE GEOTHERMAL RESOURCES OF KANSAS. VOLUME 2: APPENDICES, SECTION 4
Jun. 1982 68 p 2 Vol.
(Contract DE-AS07-79ET-17104)
(DE83-003215; DOE/ET-27204/T1-Vol-2-Sect-4) Avail: NTIS HC A04/MF A01

Correction factor analysis, repeatability study of control well, and an analysis of thermal logging method are presented. Thermal data for some deep wells in Kansas are also included. DOE

N83-22699# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: WARREN QUADRANGLE, PA. Final Report
[1982] 149 p refs Prepared in cooperation with QEB, Inc., Lakewood, Colo. 2 Vol.
(Contract DE-AC13-79GJ-01692)
(DE82-009643; GJBX-42-82-Vol-2A) Avail: NTIS HC A07/MF A01

Airborne gamma-ray spectrometers and magnetometer were investigated. The following topics are discussed: geology; radioactive mineral occurrences in Pennsylvania; geophysical data interpretation; references; and appendices. The appendices are for the following: flight line map; geology map; explanation of geologic legend; flight line/geology map; pseudo-contour maps; anomaly maps; geologic histograms; speed and altitude histograms; statistical tables; magnetic and ancillary profiles; and test line data. DOE

N83-22700# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
REMOTE SENSING AS A BIOMASS AND INSOLATION ASSESSMENT TOOL
Eugene L. Maxwell, Carol Riordan, and Gray Folger Sep. 1982 86 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-003347; SERI/PR-215-1678) Avail: NTIS HC A05/MF A01

The fundamentals supporting the use of remote sensing to assess natural resources are briefly reviewed. The extraction of information from images is developed from basic principles and related specifically to assessment of insolation and biomass energy resources. Both insolation and biomass resource assessments are shown to be currently inadequate. The number (density) of ground measurements falls short of that desired and may be almost totally lacking in developing countries and remote locations. Furthermore, most biomass data have been collected for other purposes (timber industry and agriculture) and do not provide an assessment of that biomass available for energy use. Weather satellites (e.g., GOES) can provide cloud-cover data for computer models that can improve mesoscale estimates of solar radiation. LANDSAT multispectral data can be used to estimate total green, standing crop biomass and primary production of biomass using a simple computer information extraction process. DOE

N83-22701# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIS DATA FOR MARIPOSA AND SACRAMENTO QUADRANGLES, CALIFORNIA; NEVADA. URANIUM RESOURCE EVALUATION PROJECT
15 Nov. 1982 27 p
(Contract DE-AC13-76GJ-01664)
(DE83-004485; GJBX-168-82; K/UR-448) Avail: NTIS HC A03/MF A01

Geochemical data are compiled for the surface water and ground water of Mariposa and Sacramento quadrangles of California and Nevada. GRA

N83-22702# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
CARTOGRAPHIC EVALUATION OF ENVIRONMENTAL-MANAGEMENT STRATEGIES
Jonathan C. Goyert, Karen L. Daniels, Rodney Strand, and Michael P. Farrell 1982 15 p refs Presented at the SAS Users Group Intern. Meeting, San Francisco, 14 Feb. 1982
(Contract W-7405-eng-26)
(DE82-009828; CONF-820219-4) Avail: NTIS HC A02/MF A01

A complex problem in environmental research is the evaluation of the effects of various environmental management strategies at regional, ecosystem, population and community levels. The large amount of data are presented in a form that allows decision makers at state or federal levels to knowledgeably act on the information. A series of computer-generated maps with increasing levels of resolution can be used to summarize these data and more clearly illustrate the potential effects of various decision alternatives. A number of graphic displays are presented to illustrate how policy decisions concerning California water allocation can affect salinity distribution and aquatic plant communities in San Francisco Bay. The graphic displays include a coordinate map for the regional level, bench digitized coordinate map for the ecosystem level, and a program generated coordinate map for the community level. DOE

N83-22703# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif. Energy Measurements Group.
AERIAL RADIOLOGICAL SURVEY OF THE SUSQUEHANNA STEAM ELECTRIC STATION AND SURROUNDING AREA, BERWICK, PENNSYLVANIA. DATE OF SURVEY: SEPTEMBER 1980
E. L. Feimster Mar. 1982 9 p refs
(Contract DE-AC08-76NV-01183)
(DE82-012284; EGG-1183-1811) Avail: NTIS HC A02/MF A01

An aerial radiological survey was performed from 12 to 22 September 1980 over a 188 square kilometer area surrounding the Susquehanna Steam Electric Station near Berwick, Pennsylvania. All gamma ray data were collected along flight lines oriented southwest to northeast. The lines were spaced 152 meters apart and flown at an altitude of 91 meters above ground level. It is shown that all gamma rays detected were those expected from naturally occurring terrestrial background emitters. Aerial platform count rates were converted to exposure rates at 1 meter above the ground and are presented in the form of a radiation contour map. The exposure rate obtained from soil samples taken from within the survey site were in agreement with the aerial data. Author

N83-22704# Sandia Labs., Albuquerque, N. Mex.
ORDERED CHROMATIC NUMBER OF PLANAR MAPS
Gustavus J. Simmons 1982 9 p Presented at the 13th Southeastern Conf. on Combinatorics Graph Theory and Computing, Baco Raton, Fla., 15 Feb. 1982

(Contract DE-AC04-76DP-00789)
(DE82-009914; SAND-82-0154C; CONF-820239-1) Avail: NTIS HC A02/MF A01

In this paper it is shown that there exist planar maps and orderings of the regions of those maps for which no finite number of colors will suffice for a parsimonious proper coloring. In particular, planar maps with 0(2/sup n/2/) regions are exhibited that require n colors for their proper ordered coloring. DOE

N83-22705# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: BUCKSHOT, TEXAS. VOLUME 2C: DETAIL AREA Final Report
1982 305 p refs
(Contract DE-AC13-79GJ-01692)
(DE83-002726; GJBX-196-82-Vol-2C) Avail: NTIS HC A14/MF A01

An airborne combined radiometric and magnetic survey was performed over the Buckshot Detail Area of southwestern Texas. The data displays and the interpretation results for the project area are given as well as flight line maps; geology maps; explanation of geologic legend; flight line/geology maps; and geochemical factor analysis maps. DOE

N83-22706# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
DESCRIPTION OF FORICO: A TOPICAL GAP DYNAMICS MODEL OF THE LOWER MONTANE RAIN FOREST OF PUERTO RICO
T. W. Doyle Aug. 1982 53 p refs
(Contract W-7405-eng-26; Grant NSF DEB-80-21024)
(DE83-000389; ORNL/TM-8102; ORNL/ESD-1875) Avail: NTIS HC A04/MF A01

The FORICO model, a gap dynamics model of the lower montane rain forest in Puerto Rico, is documented. It simulates gap formation and replacement of a 1/30 ha forest stand. The model increments the growth of individual trees, introduces new seedlings, and considers the death of trees on a per annum basis. This stochastic gap model also simulates the return frequency and stand damage effects of hurricanes common to West Indian Forests. Key autecological parameters of 36 common tree species are used as input to the model. Model subroutines are illustrated and described in their order and function. A listing of the FORICO model and a sample of model output is included. DOE

N83-22707# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR FRESNO AND DEATH VALLEY QUADRANGLES, CALIFORNIA; NEVADA. URANIUM RESOURCE EVALUATION PROJECT
15 Nov. 1982 63 p
(Contract DE-AC13-76GJ-01664)
(DE83-004484; GJBX-167-82; K/UR-447) Avail: NTIS HC A04/MF A01

Hydrogeochemical data are compiled for surface water and ground water of the Fresno and Death Valley quadrangles in California and Nevada. DOE

N83-22708# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
DATA REPORT: NEW ENGLAND. NATIONAL URANIUM RESOURCE EVALUATION PROGRAM. HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE
William M. Fay, Kenneth A. Sargent, and James R. Cook Feb. 1982 37 p
(Contract DE-AC09-76SR-00001)
(DE82-012357; GJBX-107-82; DPST-81-146-27) Avail: NTIS HC A03/MF A01

The results of ground water, stream water, and stream sediment reconnaissance in Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine are given. Sediment samples were collected from 635 sites in Connecticut, 81 sites in Rhode Island, 1331 sites in Massachusetts, 1677 sites in Vermont, 1699 sites in New Hampshire, and 3024 sites in Maine. Ground water samples were collected from 798 sites in Connecticut, 77 sites in Rhode Island, 657 sites in Massachusetts, 972 sites in Vermont, 884 sites in New Hampshire, and 1938 sites in Maine. Stream water samples were collected from 656 sites in Connecticut, 81 sites in Rhode Island, 1304 sites in Massachusetts, 1663 sites in Vermont, 1694 sites in New Hampshire, and 2039 sites in Maine. Neutron activation analyses are given for U, Br, Cl, F, Mn, Na, Al, V, and Dy in ground water and stream water, and for U, Th, Hf, Ce, Fe, Mn, Na, Sc, Ti, V, Al, Dy, Eu, La, Sm, Yb, and Lu in sediments. DOE

N83-22709# California Univ., Berkeley. Lawrence Berkeley Lab. Physics, Computer Science and Mathematics Div.
PREDICTING A CONTINUOUS SPATIAL VARIABLE FROM DISCRETE-POINT MEASUREMENTS
Laura D. Johnson, D. W. Merrill, and S. Selvin Mar. 1982 16 p refs
(Contract DE-AC03-76SF-00098)
(DE82-021684; LBL-14235) Avail: NTIS HC A02/MF A01

Results obtained by estimation of an average level of atmospheric pollution for an area based on point data derived from monitoring stations may be seriously biased as an estimator of the mean level of pollution. An alternative is to fit an interpolating surface to the data values and find its average. A very simple way to smooth or interpolate is to calculate the value of a surface as a weighted average of the values at the data points. This method is called a moving average. Criteria are imposed so that the surface is smooth at the data points. These weights are chosen as a function of the distance between the data points and the estimation point. The method of estimation used in this study is a weighted mean (i.e., an arithmetic mean of the logarithm of the geometric mean concentrations) and therefore is an example of a moving average. Three air pollutant monitoring stations in different geographic locations were used for the study. DOE

N83-22710# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR IDAHO FALLS QUADRANGLE, IDAHO. URANIUM RESOURCE EVALUATION PROJECT
9 Nov. 1982 46 p
(Contract DE-AC13-76GJ-01664)
(DE83-004529; GJBX-173-82; K/UR-453) Avail: NTIS HC A03/MF A01

Hydrogeochemical data are compiled for ground water and surface water of the Idaho Falls quadrangle in Idaho. GRA

N83-22711# Union Carbide Corp., Oak Ridge, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR HAILEY AND CHALLIS QUADRANGLES, IDAHO
18 Nov. 1982 67 p
(Contract DE-AC13-76GJ-01664)
(DE83-004482; GJBX-172-82; K/UR-452) Avail: NTIS HC A04/MF A01

Hydrogeochemical data are compiled for ground water and surface water for the Hailey and Challis quadrangles in Idaho. GRA

N83-22712# Michigan Dept. of Natural Resources, Lansing. Water Quality Div.
GROUNDWATER MANAGEMENT STRATEGY FOR MICHIGAN: DRAFT RESPONSE AND INCIDENT TRACKING PROCEDURES
Jul. 1982 19 p
(Grant EPA-P-00558801)
(PB83-116087; MI/DNR/GW-82/05) Avail: NTIS HC A02/MF A01 CSCL 08H

Several management tools are needed to guide state response to incidents of ground-water pollution because of the large number of incidents at which State response actions may need to be performed. Two primary management tools are described in this document. These management tools are: General response procedures - guidance as to how and when state actions are initiated in response to incidents of groundwater pollution concern;

and incident tracking procedures - An Information Management System to facilitate the recording, tracking and distribution of information on the status of each contamination incident. GRA

N83-22713# Maine Univ., Orono. Land and Water Resources Inst.
STEADY-STATE ECOSYSTEM MODELING FOR LAKE MANAGEMENT
Mark L. Hutchins and Paul D. Uttormark Jul. 1982 72 p refs Sponsored by Office of Water Research and Technology
(PB83-125153; W83-00610; OWRT-B-018-ME(2)) Avail: NTIS HC A04/MF A01 CSCL 08H

Two relatively simple models describe general ecosystem structure and interactions in the open water zones of lakes are presented. These models are concerned with long term steady state conditions, rather than seasonal dynamics, and are used to examine how steady state standing crops of the system components might be expected to change in response to a variety of system perturbations. It is shown that enhancing lake game fish populations may produce positive/negative effects on algal populations, depending on system structure/interactions. Two distinctly different steady state lake ecosystems were found possible for a given nutrient supply rate. The ecological significance of two equilibria states is elaborated. GRA

N83-22714# Geological Survey, Menlo Park, Calif. Water Resources Div.
WATER RESOURCES DATA FOR KANSAS, WATER YEAR 1981 Annual Water-data Report, 1 Oct. 1980 - 30 Sep. 1981
Jul. 1982 580 p refs Prepared in cooperation with the state of Kansas
(PB83-129114; USGS/WRD/KS-81/1; USGS/WRD/HD-82/052) Avail: NTIS HC A25/MF A01 CSCL 08H

Water resources data for the 1981 water year for Kansas consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells. Tables show discharge records for 153 gaging stations; stage and contents for 22 lakes and reservoirs; water quality for 75 gaging stations; and water levels for 481 observation wells and water quality for 319 wells. GRA

N83-22715# Geological Survey, St. Paul, Minn. Water Resources Div.
WATER RESOURCES DATA FOR MINNESOTA, WATER YEAR 1981. VOLUME 2. GREAT LAKES AND SOURIS-RED-RAINY RIVER BASINS Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Jul. 1982 234 p refs Prepared in cooperation with the state of Minnesota 2 Vol.
(PB83-131979; USGS/WRD/MN-81/1; USGS/WRD/HD-82/056) Avail: NTIS HC A11/MF A01 CSCL 08H

Water-resources data for the 1981 water year for Minnesota consist of records of stage, discharge and water of streams; stage, contents and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. Discharge records for 47 gaging stations; stage-only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 9 gaging stations, 1 stage station, 14 partial-record lake stations, and 21 wells; and water levels for 56 observation wells are given. Author (GRA)

N83-22716*# Miami Univ., Coral Gables, Fla.
VERIFICATION AND TRANSFER OF THERMAL POLLUTION MODEL. VOLUME 4: USER'S MANUAL FOR THREE-DIMENSIONAL RIGID-LID MODEL Final Report, Mar. 1978 - Sep. 1980
Samuel S. Lee, Emmanuel Nwadike, and Sumon E. Sinha May 1982 156 p refs
(Contract NAS10-9410)
(PB83-116103; NASA-CR-170043; NAS 1.26:170043; EPA-600/7-82-037D-Vol-4) Avail: NTIS HC A08/MF A01 CSCL 08H

The theory of a three dimensional (3-D) mathematical thermal discharge model and a related one dimensional (1-D) model are described. Model verification at two sites, a separate user's manual for each model are included. The 3-D model has two forms: free surface and rigid lid. The former allows a free air/water interface and is suited for significant surface wave heights compared to mean water depth, estuaries and coastal regions. The latter is suited for small surface wave heights compared to depth because surface elevation was removed as a parameter. These models allow computation of time dependent velocity and temperature fields for given initial conditions and time-varying boundary conditions. The free surface model also provides surface height variations with time. GRA

N83-22717# Geological Survey, Tallahassee, Fla.
AQUIFER TEST RESULTS, GREEN SWAMP AREA, FLORIDA
C. H. Tibbals and H. F. Grubb 1982 39 p refs Sponsored in part by the Southwest Florida Water Management District
(PB83-117903; USGS/WRI-82-35; USGS/WRD/WRI/82-069) Avail: NTIS HC A03/MF A01 CSCL 08H

An aquifer test conducted in the Green Swamp area designed to stress the uppermost part of the Floridan aquifer to determine the leakage characteristics of the overlying confining bed is discussed. A well tapping the upper part of the Floridan aquifer was pumped at a rate of about 1,040 gal/min for 35 hours; drawdown was measured in the Floridan aquifer and in two horizons in the confining bed. It is found that the transmissivity of the upper 160 feet of the Floridan is about 13,000 sq ft/d., which indicates that, in the area of the test site, a Floridan aquifer well field could induce additional recharge to the Floridan. GRA

N83-22718# Geological Survey, Honolulu, hawaii. Water Resources Div.
WATER RESOURCES DATA FOR HAWAII, WATER YEAR 1981. VOLUME 1: HAWAII Annual Report, 1 Oct. 1980 - 30 Sep. 1981
Jul. 1982 279 p
(PB83-134791; USGS/WRD/HI-81/01; USGS/WRD/HD-81/055) Avail: NTIS HC A13/MF A01 CSCL 08H

The report, volume 1, of water resources data for the 1981 water year for Hawaii and other Pacific Areas consists of records of stage, discharge, and water quality of streams; and water levels and water quality in wells and springs. This report contains discharge records for 106 gaging stations; water quality for 11 gaging stations, 103 partial-record flow stations, and 150 wells; and water levels for 21 observation wells. GRA

N83-22719# Geological Survey, Rolla, Mo. Water Resouces Div.
WATER RESOURCES DATA FOR MISSOURI, WATER YEAR 1981 Annual Water-Data Report, 1 Oct. - 30 Sep. 1981
Oct. 1982 406 p refs Sponsored in part by state of Missouri
(PB83-137075; USGS/WRD/MO-82/1; USGS/WRD/HD-82/066) Avail: NTIS HC A16/MF A01 CSCL 08H

Water resources data for the 1981 water year for Missouri consist of records of stage, discharge, and water quality of lakes and reservoirs; contains records for water discharge at 124 gaging stations; stage and contents at 7 lakes and reservoirs; water quality at 33 gaging stations (including 1 lake); 11 sites measured bi-monthly, 2 USGS water quality monitors, and 1 temperature (continuous recording) site. Also included are data for 30 crest-stage, 11 water-quality partial-record stations, and 20 low-flow partial-record stations. GRA

N83-22720# New York Univ., New York. Inst. for Economic Analysis.
THE PRODUCTION AND CONSUMPTION OF NON-FUEL MINERALS TO THE YEAR 2030 ANALYZED WITHIN AN INPUT-OUTPUT FRAMEWORK OF THE U.S. AND WORLD ECONOMY (TECHNIQUES FOR CONSISTENT FORECASTING OF FUTURE DEMAND FOR MAJOR MINERALS USING AN INPUT-OUTPUT FRAMEWORK)
Wassily Leontief, James Koo, Sylvia Nasar, and Ira Sohn Jun.

1982 587 p refs
(Grant NSF AER-77-14602)
(PB83-122564; NSF/CPE-82002) Avail: NTIS HC A25/MF A01 CSCL 05C

A study was undertaken to project a set of future production and consumption levels of 26 major non-fuel minerals for the U.S. and the world economy to the year 2030. Alternative assumptions regarding future U.S. and world economic growth and structural change are discussed. The main methodological tools used in the study were the 1972 Input-Output Table of the U.S. Economy and a revised version of the U.N. World Input-Output Model. Discussions of the role of resources in the economy, a review of past U.S. minerals policies, and a summary of previous studies undertaken to project future minerals requirements are included. Problems of potential resource imbalances are addressed. GRA

N83-22721# Intermountain Forest and Range Experiment Station, Ogden, Utah.
A SURVEY OF POTENTIAL ECOLOGICAL NATURAL LANDMARKS OF THE MIDDLE ROCKY MOUNTAINS Final Report
Janet L. Johnson and Robert D. Pfister Jun. 1982 198 p refs
(Contract NPS-CX-0001-1-0078)
(PB83-122630) Avail: NTIS HC A09/MF A01 CSCL 05K

This study is one of a series of 61 which cover the natural regions of the United States. Each study describes the ecological features characteristic of that region, then evaluates sites representative of the various features. Sites which are outstanding examples are suggested as potential National Natural Landmarks. This report describes 55 sites of ecological significance in the Middle Rocky Mountains natural region, including areas in Idaho, Montana, Utah, and Wyoming. GRA

N83-22722# Wisconsin Univ., Milwaukee. Dept. of Botany and Geology.
ECOLOGY AND GEOLOGY OF THE SUPERIOR UPLAND REGION: A THEME STUDY FOR THE NATIONAL PARK SERVICE Final Report
Forest Stearns, Norman P. Lasca, Janet Keough, and Cheong-Yip Yuen Feb. 1982 212 p refs
(Contract NPS-CX-0001-1-0073)
(PB83-126276) Avail: NTIS HC A10/MF A01 CSCL 05K

The ecological and/or geological features characteristic of natural regions are described and sites representative of the various features were evaluated. Sites which are outstanding examples are suggested as potential National Natural Landmarks. Thirty four areas of ecologic and geologic significance throughout the Superior Uplands natural region which includes northern portions of the states of Minnesota, Wisconsin and Michigan are described. GRA

N83-22723# Technische Hogeschool, Delft (Netherlands). Onderafdeling der Wiskunde en Informatica.
DOPPLER SATELLITE POSITIONING IN UPPER VOLTA
G. J. Husti 1981 34 p refs
(PB83-116293; Rept-81-1) Avail: NTIS HC A03/MF A01 CSCL 08E

A wide-meshed network was established in Upper Volta by means of Doppler satellites. Such a geodetic network is needed among others for determining control points in behalf of photogrammetric survey. GRA

N83-22724# Northeastern Forest Experiment Station, Broomall, Pa.
EROSION ON VERY STONY FOREST SOIL DURING PHENOMENAL RAIN IN WEBSTER COUNTY, WEST VIRGINIA Final Forest Service Research Paper
James H. Patric and William E. Kidd, Jr. 1982 17 p refs
(PB83-128140; FSRP-NE-501; NEFES/83-20) Avail: NTIS HC A02/MF A01 CSCL 02F

On July 15 and 16, 1979, at least 6 inches of rain fell in central West Virginia during 3 hours, a storm of return period longer than 1,000 years. More than 6 miles of logging roads were examined for evidence of soil erosion and sediment delivery to streams in the report. GRA

N83-22725# Geological Survey, Oklahoma City, Okla. Water Resources Div.
WATER RESOURCES DATA FOR OKLAHOMA, WATER YEAR 1980 Annual Water-Data Report, 1 Oct. 1979 - 30 Sep. 1980
Jun. 1982 623 p refs Sponsored in part by state of Oklahoma
(PB83-116095; USGS/WRD/HD-81/041; USGS/WRD/OK-80) Avail: NTIS HC A99/MF A01 CSCL 08H

Water resources data for the 1980 water year for Oklahoma consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes or reservoirs. Discharge records for 138 gaging stations; stage and contents for 25 lakes or reservoirs; water quality for 77 gaging stations and 3 lakes; and water levels for 43 wells are presented. Also included are 44 crest-stage partial-record stations. GRA

N83-22726# Geological Survey, Salt Lake City, Utah. Water Resources Div.
WATER RESOURCES DATA FOR UTAH, WATER YEAR 1981 Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Jun. 1982 724 p refs Sponsored in part by State of Utah
(PB83-120188; USGS/WRD/UT-81/1; USGS/WRD/HD-82/044) Avail: NTIS HC A99/MF A01 CSCL 08H

Water resources data for the 1981 water year for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. Included are: discharge records for 274 gaging stations; stage and contents for 19 lakes and reservoirs; water quality for 65 hydrologic stations, and 375 wells; miscellaneous temperature measurements and field determinations for 181 stations; and water levels for 36 observation wells. GRA

N83-22727# Geological Survey, Lakewood, Colo. Water Resources Div.
WATER RESOURCES DATA FOR COLORADO, WATER YEAR 1981. VOLUME 3: DOLORES RIVER BASIN, GREEN RIVER BASIN AND SAN JUAN RIVER BASIN Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Jun. 1982 450 p refs Sponsored in part by the State of Colorado
(PB83-124446; USGS/WRD/CO-81/3-Vol-3;
USGS/WRD/HD-82/036-Vol-3) Avail: NTIS HC A19/MF A01 CSCL 08H

Water resources data for Colorado for the 1981 water year consist of records of stage, discharge, and water quality of streams; stage, contents and water quality of lakes and reservoirs, and water levels and water quality of wells and springs. Discharge records are reported for about 460 gaging stations, stage and contents of 22 lakes and reservoirs, 4 partial record low flow stations, 30 crest stage partial record stations, and 50 miscellaneous sites; water quality for 163 gaging stations and 300 miscellaneous sites; and water levels for 55 observation wells. GRA

N83-22728# Geological Survey, Albany, N.Y. Water Resources Div.
GEOLOGY AND GROUND-WATER RESOURCES OF OSWEGO COUNTY, NEW YORK Final Water-Resources Investigations, 1979 -1980
Todd S. Miller 1982 43 p refs Sponsored in part by Oswego County Planning Board
(PB83-124651; USGS/WRD/WRI-82-071; USGS/WRI-81-60) Avail: NTIS HC A03/MF A01 CSCL 08H

Unconsolidated deposits of Pleistocene and Holocene age form a nearly continuous cover in Oswego County were examined. Pleistocene deposits consist of lodgement and ablation tills; outwash; kame, beach, and wave delta sand and gravel; and lacustrine sand, silt, and clay. Holocene deposits consist of peat and muck deposited in wetlands and alluvial silt, sand, and gravel deposited in stream valleys. Unconsolidated deposits contain sufficient water for domestic and small farm needs except in areas

mantled by silt and clay. Sand and gravel deposits are the best source of large quantities of water. Aquifers in glacial outwash are common in the eastern Tug Hill region, whereas kame, esker-kame, and beach aquifers predominate in the eastern and central regions. Shallow wells in bedrock generally have water of fair to good quality, but mineral content increases with depth.GRA

N83-22729# Geological Survey, Indianapolis, Ind. Water Resources Div.
WATER RESOURCES DATA INDIANA, WATER YEAR 1981 Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Sep. 1982 464 p
(PB83-124883; USGS/WRD/IN-81/1; USGS/WRD/HD-82/050) Avail: NTIS HC A20/MF A01 CSCL 08H

Water resources data for the 1981 water year for Indiana consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels in wells. Discharge records for 195 gaging stations, stage and contents for 12 lakes and reservoirs, releases from 6 flood control reservoirs, water quality for 51 gaging stations, and water levels for 84 observation wells are given. Also included are 95 crest-stage partial-record stations and 42 low-flow partial-record stations. Author (GRA)

N83-22730# Geological Survey, Doraville, Ga. Water Resources Div.
ANNUAL WATER-DATA REPORT, 1 OCT. 1980 - 30 SEP. 1981
Jun. 1982 459 p
(PB83-127837; USGS/WRD/HD-81/049; USGS/WRD/GA-81/1) Avail: NTIS HC A20/MF A01 CSCL 08H

Water resources data for the 1981 water year for Georgia consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and groundwater levels. Discharge records of 109 gaging stations; stage for 10 gaging stations; stage and contents for 17 lakes and reservoirs; water quality for 22 continuous stations, 131 periodic stations and miscellaneous sites; peak stage and discharge only for 106 creststage partial-record stations and 4 miscellaneous sites; measurements of dicharge at 25 low-flow partial-record stations and 57 miscellaneous sites; and water levels of 28 observation wells are given. Author (GRA)

N83-22731# Illinois State Environmental Protection Agency, Springfield. Div. of Water Pollution Control.
WATER RESOURCE DATA AND PRELIMINARY TREND ANALYSIS FOR THE BLUE CREEK WATERSHED PROJECT, PIKE COUNTY, ILLINOIS, PHASE 2
Thomas E. Davenport Sep. 1982 173 p refs
(PB83-119917; IEPA/WPC/82-008) Avail: NTIS HC A08/MF A01 CSCL 08H

The purpose of this report is to present and briefly interpret preliminary trends in water quality data collected from project inception thru September 30, 1981 as part of the Blue Creek Watershed project. The primary purpose of this monitoring and evaluation project is to determine the actual yield of pollutants from a variety of agricultural practices to downstream receiving water and its effect upon the water quality and reasonable uses of the water resources. Monitoring and evaluation of actual Resource Management System implementation progress on sub-watersheds and yield of pollutants to the major tributary stream and public water supply lake will allow a reliable comparison of low and high-cost practices and downstream yield reductions. GRA

N83-22732# Geological Survey, Columbia, S.C. Water Resources Div.
WATER RESOURCES DATA FOR SOUTH CAROLINA, WATER YEAR 1981 Annual Water-Data Report, 1 Oct. 1980 - 30 Sep. 1981
Jul. 1982 349 p Sponsored in part by the State of South Carolina
(PB83-119883; USGS/WRD/HD-81/046; USGS/WRD/SC-81/1) Avail: NTIS HC A15/MF A01 CSCL 08H

Water resources data for the 1981 water year for South Carolina consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells. Discharge records for 85 gaging stations; stage only records for 6 gaging stations; stage and contents for 11 lakes and reservoirs; water quality for 36 gaging stations; and water levels for 47 observation wells are reported. Also included are 44 crest-stage partial record stations. GRA

N83-22733# Geological Survey, Baton Rouge, La. Water Resources Div.
WATER RESOURCES DATA LOUISIANA, WATER YEAR 1981. VOLUME 1. CENTRAL AND NORTHERN LOUISIANA Water Data Report, 1 Oct. 1980 - 30 Sep. 1981
Mar. 1982 438 p refs Sponsored in part by the State of Louisiana 3 Vol.
(PB83-116111; USGS/WRD/HD-81/021; USGS/WDR/LA-1) Avail: NTIS HC A19/MF A01 CSCL 08H

Water resources data for the 1981 water year for Louisiana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. Records for water discharge at 81 gaging stations (including stage for 76 of these stations); stage only for 37 gaging stations and 10 lakes; contents for 1 reservoir; water quality for 142 surface-water stations (including 35 gaging stations), 27 miscellaneous sites, and 10 lakes, and 286 wells; and water levels for 679 observation wells are given. Author (GRA)

N83-22734# Intermountain Forest and Range Experiment Station, Ogden, Utah. Forest Fire Lab.
HANDBOOK FOR INVENTORYING SURFACE FUELS AND BIOMASS IN THE INTERIOR WEST
James K. Brown, Rick D. Oberheu, and Cameron M. Johnston Aug. 1982 52 p refs
(PB83-118125; FSGTR/INT-129) Avail: NTIS HC A04/MF A01 CSCL 02F

This report presents comprehensive procedures for inventorying weight per unit area of living and dead surface vegetation, to facilitate estimation of biomass and appraisal of fuels. Provides instructions for conducting fieldwork and calculating estimates of downed woody material, forest floor litter and duff, herbaceous vegetation, shrubs, and small conifers. Procedures produce the most accurate estimates in the interior West; however, techniques for herbs, litter, and downed woody material are applicable anywhere. Includes computer program and card punching instructions for processing inventory data. GRA

N83-22735# Kansas State Univ., Manhattan. Evapotranspiration Lab.
USE OF SATELLITE DATA IN SOIL MOISTURE AND CROP YIELD MODELS Final Report, Mar. 1981 - Jun. 1982
E. T. Kanemasu Jun. 1982 135 p refs
(Grant NA800AA-D-00046)
(PB83-117457; NOAA-82091503) Avail: NTIS HC A07/MF A01 CSCL 02D

An evapotranspiration yield model for winter wheat was used to assess the impact of using GOES derived solar radiation estimates on plant growth models. Evapotranspiration (ET) rates were predicted using observed solar radiation estimates and those predicted from GOES using Tarpley's model and KSU's model. The yield model predicted grain yields that were similar regardless of the model used in estimating solar radiation. It appears that either of these two models (Tarpley's or KSU's) are appropriate for estimating daily solar radiation in a crop growth model such as KSU wheat model. GRA

N83-22736# Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering.
OPTIMIZING SALINITY CONTROL STRATEGIES FOR THE UPPER COLORADO RIVER BASIN Final Report
Robert G. Evans, Wynn R. Walker, and Gaylord V. Skogerboe Jun. 1982 225 p refs

(Grant EPA-R-806148)
(PB83-136143; EPA-600/2-82-077) Avail: NTIS HC A10/MF A01 CSCL 13B

A simple multi-level nonlinear optimization procedure was utilized to formulate the most cost-effective array of salinity control strategies for the Upper Colorado River Basin. The incremental cost-effectiveness methodology qualitatively indicates the location and general type of alternatives to be implemented in a least-cost basin-wide salinity control program. The results also qualitatively indicated the anticipated salt load reduction and expected annual costs of each salinity reduction increase for any preselected level of control. Costs and salinity contributions associated with various alternatives were generated using January, 1980 estimated conditions. Marginal cost analysis based on current damage estimates indicate that the optimal cost-effective salinity control program in the Upper Basin would cost about $30 million annually. Author (GRA)

N83-22673# New Mexico Energy and Minerals Dept., Santa Fe.
ROLE OF ENERGY RESOURCES IN NEW MEXICO
In its Energy Resources in New Mexico 1982 p 13-16 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-22674# New Mexico Energy and Minerals Dept., Santa Fe.
OIL AND GAS
In its Energy Resources in New Mexico 1982 p 17-36 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-22675# New Mexico Energy and Minerals Dept., Santa Fe.
COAL
In its Energy Resources in New Mexico 1982 p 37-46 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-22677# New Mexico Energy and Minerals Dept., Santa Fe.
URANIUM
In its Energy Resources in New Mexico 1982 p 60-78 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-22651# Hokkaido Univ., Sapporo (Japan).
STUDIES OF THE BEHAVIOR OF A SNOW COVER ON A MOUNTAIN SLOPE. 5: EXAMPLES OF CURVES Ch AND Cv, RELATIONSHIP BETWEEN RATIO GAMMA OF PRINCIPAL STRAIN RATES AND RATIO GAMMA PRIME OF PRINCIPAL STRESSES
Zyungo Yosida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 25-42 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22652# Hokkaido Univ., Sapporo (Japan).
STUDIES OF THE BEHAVIOR OF A SNOW COVER ON A MOUNTAIN SLOPE. 11: POISSON'S RATIO OF SNOW, 1
Mitsuo Ooizumi and Tosio Huzioka *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 43-53 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22655# Hokkaido Univ., Sapporo (Japan).
MICRO-PRESSURE WAVES NEAR THE SNOW SURFACE
Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 76-79 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22658# Hokkaido Univ., Sapporo (Japan).
MELTING AT THE BOTTOM OF A SNOW COVER DURING THE WINTER IN AN AREA WITH VERY LOW TEMPERATURES AND DEEP SNOW. VARIATION IN MELTING RATE WITH TIME AND YEAR
Kenji Kojima *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 99-107 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22659# Hokkaido Univ., Sapporo (Japan).
MEASUREMENT OF SENSIBLE HEAT FLUX IN THE SNOW-MELTING SEASON, 1
Nobuyoshi Ishikawa and Shunichi Kobayashi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 109-116 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22662# Hokkaido Univ., Sapporo (Japan).
ANALYSIS AND CHARACTERISTICS OF CORES FROM A MASSIVE ICE BODY IN MACKENZIE DELTA, N.W.T., CANADA
Kazuo Fujino, Kaoru Horiguchi, Kunio Shinbori, and Kikuo Kato *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 143-150 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22663# Hokkaido Univ., Sapporo (Japan).
CORRELATION BETWEEN SHAPE AND CRYSTALLOGRAPHIC AXES OF SINGLE CRYSTALS IN GLACIER ICES
Mutsumi Ohtomo and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 151-158 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22664# Hokkaido Univ., Sapporo (Japan).
SNOW LAYER ON SEA ICE
Takatoshi Takizawa and Masaaki Wakatsuchi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 159-165 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22665# Hokkaido Univ., Sapporo (Japan).
SALINITY PROFILES OF NEWLY GROWN SEA ICE
Masaaki Wakatsuchi and Takatoshi Takizawa *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 167-172 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22666# Hokkaido Univ., Sapporo (Japan).
MEASUREMENTS OF CRYSTALLOGRAPHIC ORIENTATIONS OF SEA ICE
Toshiyuki Kawamura *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 173-178 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22667# Hokkaido Univ., Sapporo (Japan).
SHORT-TERM VARIATIONS IN HEAT BUDGET WITH THE GROWTH OF SEA ICE, 1
Nobuyoshi Ishikawa and Shunichi Kobayashi *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 178-189 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N83-22737# British Library Lending Div., Boston Spa (England).
HIGHER LEVEL OF UTILIZATION OF FUEL-ENERGY RESOURCES
A. P. Petrakovskii and G. P. Afansev 20 Dec. 1982 7 p Transl. into ENGLISH from Stal (USSR), v. 12, 1981 p 7-8

(BLL-M-26855-(5825.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Measures taken to achieve economies in fuel and power utilization, mainly during the 10th five year plan are reviewed, with particular reference to the use of secondary fuel energy resources and their prospective utilization in the region during the period 1981-1985. Author

N83-22738# British Library Lending Div., Boston Spa (England).
POSSIBILITIES OF IMPROVING DEGREE OF PERFECTION AND EFFECTIVENESS OF USE OF SECONDARY THERMAL ENERGY RESOURCES
L. S. Gornostaev, F. N. Demchenko, E. A. Drachenin, and N. I. Zhidkov 20 Dec. 1982 11 p Transl. into ENGLISH from Stal (USSR), no. 12, 1981 p 18-21
(BLL-M-26859-(5825.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A thorough examination is made of the most rational methods of improving the effectiveness of secondary thermal energy resources (STER) within a district-heating system centered on an integrated iron- and steelworks (IISW). STER must not be utilized haphazardly, but in an extremely rational fashion to give greatest possible fuel efficiency. In particular, supplanting the heat from the turbine bleeds of central heating-and-power-secondary steam power plants (EGP-SGP), which reduces the production economy of electrical and mechanical power, is acceptable only in special cases. The main trend in the utilization of STER at a works with full processing cycle should, owing to the particular characteristics of its energy balance, lie in the direction of heating power, namely in district-heating system turbines. The STER steam parameters of many heat raising plants should be raised to power-parameter values, the costs of such practice being defrayed within a year. Author

N83-22739*# Foster-Miller Associates, Inc., Waltham, Mass.
DESIGN OF HYDRAULIC OUTPUT STIRLING ENGINE Final Report
William M. Toscano, Andrew C. Harvey, and Kangpil Lee Jan. 1983 130 p refs
(Contract NAS3-22230)
(NASA-CR-167976; NAS 1.26:167976) Avail: NTIS HC A07/MF A01 CSCL 10B

A hydraulic output system for the RE-1000 free piston stirling engine (FPSE) was designed. The hydraulic output system can be readily integrated with the existing hot section of RE-1000 FPSE. The system has two simply supported diaphragms which separate the engine gas from the hydraulic fluid, a dynamic balance mechanism, and a novel, null center band hydraulic pump. The diaphragms are designed to endure more than 10 billion cycles, and to withstand the differential pressure load as high as 14 MPa. The projected thermodynamic performance of the hydraulic output version of RE-1000 FPSE is 1.87 kW at 29/7 percent brake efficiency. S.L.

N83-22740*# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
SOME EXPERIMENTS ON YAW STABILITY OF WIND TURBINES WITH VARIOUS CONING ANGLES Final Report
David Bundas and John Dugundji Jul. 1981 31 p refs
(Grant NsG-3303; Contract DE-AI01-76ET-20320)
(NASA-CR-168108; DOE/NASA/3303-1; NAS 1.26:168108; MIT-ASRL-TR-197-2) Avail: NTIS HC A03/MF A01 CSCL 10B

A horizontal axis wind turbine was constructed to study the effect of coning angle on the yawing moments produced. Coning angles of 0 deg, +10 deg and -10 deg were studied in the upwind and downwind cases. Moment and rotational frequency of the blades at each yaw angle setting were taken. It was found that as the coning angle increased from -10 deg to +10 deg in either the upwind or downwind case the stability decreased. The downwind case was slightly more stable for all coning angles than was the upwind case. It is found that all the previous cases were stable for high rotation speeds, but at lower rotation speeds, they were all unstable and could not self start unless held in the wind. E.A.K.

N83-22741*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Space Systems Div.
LIGHTWEIGHT SOLAR ARRAY BLANKET TOOLING, LASER WELDING AND COVER PROCESS TECHNOLOGY Final Report
Paul A. Dillard Jan. 1983 51 p refs Prepared for JPL
(Contracts NAS7-918; JPL-956020)
(NASA-CR-170209; NAS 1.26:170209; LMSC-D843530) Avail: NTIS HC A04/MF A01 CSCL 10A

A two phase technology investigation was performed to demonstrate effective methods for integrating 50 micrometer thin solar cells into ultralightweight module designs. During the first phase, innovative tooling was developed which allows lightweight blankets to be fabricated in a manufacturing environment with acceptable yields. During the second phase, the tooling was improved and the feasibility of laser processing of lightweight arrays was confirmed. The development of the cell/interconnect registration tool and interconnect bonding by laser welding is described. S.L.

N83-22742*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Electrical Power Systems Lab.
DEVELOPMENT OF TECHNOLOGIES FOR WELDING INTERCONNECTS TO FIFTY-MICRON THICK SILICON SOLAR CELLS Interim Report, 14 May 1981 - Dec. 1982
R. E. Patterson Dec. 1982 67 p refs Prepared for JPL, Pasadena, Calif.
(Contracts NAS7-918; JPL-956042)
(NASA-CR-170212; JPL-9950-806; NAS 1.26:170212; TRW-38512.000) Avail: NTIS HC A04/MF A01 CSCL 10A

A program was conducted to develop technologies for welding interconnects to 50 microns thick, 2 by 2 cm solar cells. The cells were characterized with respect to electrical performance, cell thickness, silver contact thickness, contact waviness, bowing, and fracture strength. Weld schedules were independently developed for each of the three cell types and were coincidentally identical. Thermal shock tests (100 cycles from 100 C to -180 C) were performed on 16 cell coupons for each cell type without any weld joint failures or electrical degradation. Three 48 cell modules (one for each cell type) were assembled with 50 microns thick cells, frosted fused silica covers, silver clad Invar interconnectors, and Kapton substrates. Author

N83-22743*# Spire Corp., Bedford, Mass.
HERMETIC EDGE SEALING OF PHOTOVOLTAIC MODULES Quarterly Technical Report, Nov. 1982 - Jan. 1983
Feb. 1983 26 p refs Prepared for JPL
(Contract JPL-956352)
(NASA-CR-170208; DOE/JPL-956352/1; NAS 1.26:170208; QR-10084-01) Avail: NTIS HC A03/MF A01 CSCL 10A

The edge sealing technique is accomplished by a combination of a chemical bond between glass and aluminum, formed by electrostatic bonding, and a metallurgical bond between aluminum and aluminum, formed by ultrasonic welding. Such a glass to metal seal promises to provide a low cost, long lifetime, highly effective hermetic seal which can protect module components from severe environments. Development of the sealing techniques and demonstration of their effectiveness by fabricating a small number of dummy modules, up to eight inches square in size, and testing them for hermeticity using helium leak testing methods are reviewed. Non-destructive test methods are investigated. Author

N83-22744*# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
THE STRUCTURE OF > 110 < TILT BOUNDARIES IN LARGE AREA SOLAR SILICON Annual Report, 31 Aug. 1981 - Sep. 1982
Dieter G. Ast, B. Cunningham, and M. Vaudin Dec. 1982 24 p refs Sponsored in part by DOE Prepared for JPL
(Contract JPL-956046)

(NASA-CR-170204; DOE/JPL-956046-82/5; NAS 1.26:170204; AR-5) Avail: NTIS HC A02/MF A01 CSCL 10A

The models of Hornstra and their connection to the repeating group description of grain boundaries (7-10) are discussed. A model for the Sigma = 27 boundary containing a zig-zag arrangement of dislocations is constructed and it is shown that zig-zag models can account for the contrast features observed in high resolution transmission electron micrographs of second and third order twin boundaries in silicon. The boundaries discussed are symmetric with a [110] tilt axis and a (110) boundary plane in the median lattice (the median plane). The median lattice is identical in structure and halfway in orientation between the crystal lattices either side of the boundary. Author

N83-22745*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
STRESS STUDIES IN EFG Quarterly Progress Report, 1 Oct. - 31 Dec. 1982
15 Feb. 1983 22 p refs Sponsored by NASA and DOE Prepared for JPL, Pasadena, Calif.
(Contract JPL-956312)
(NASA-CR-170205; JPL-9950-810; DOE/JPL-956312-83/02; NAS 1.26:170205; QPR-2) Avail: NTIS HC A02/MF A01 CSCL 10A

A computer code which can account for plastic deformation effects on stress generated in silicon sheet grown at high speeds is fully operative. Stress and strain rate distributions are presented for two different sheet temperature profiles. The calculations show that residual stress levels are very sensitive to details of the cooling profile in a sheet with creep. Experimental work has been started in several areas to improve understanding of ribbon temperature profiles and stress distributions associated with a 10 cm wide ribbon cartridge system. Author

N83-22746*# IIT Research Inst., Chicago, Ill.
FATIGUE TESTING OF LOW-COST FIBERGLASS COMPOSITE WIND TURBINE BLADE MATERIALS Final Report
K. E. Hofer and L. C. Bennett Nov. 1981 89 p refs
(Contracts DEN3-182; DE-AI01-79ET-20320)
(NASA-CR-165566; DOE/NASA/0182-1; NAS 1.26:165566; IITRI-M06066-22) Avail: NTIS HC A05/MF A01 CSCL 10B

The static and fatigue behavior of transverse filament tape (TFT) fiberglass/epoxy and TFT/polyester composites was established by the testing of specimens cut from panels fabricated by a filament winding process used for the construction of large experimental wind turbine blades. Author

N83-22747*# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
DEVELOPMENT OF METHODOLOGY FOR HORIZONTAL AXIS WIND TURBINE DYNAMIC ANALYSIS Final Summary Report
John Dugundji Sep. 1982 11 p refs
(Grant NsG-3303; Contract DE-AI01-76ET-20320)
(NASA-CR-168110; DOE/NASA/3303-4; NAS 1.26:168110; MIT-ASRL-TR-197-5) Avail: NTIS HC A02/MF A01 CSCL 10B

Horizontal axis wind turbine dynamics were studied. The following findings are summarized: (1) review of the MOSTAS computer programs for dynamic analysis of horizontal axis wind turbines; (2) review of various analysis methods for rotating systems with periodic coefficients; (3) review of structural dynamics analysis tools for large wind turbine; (4) experiments for yaw characteristics of a rotating rotor; (5) development of a finite element model for rotors; (6) development of simple models for aeroelastics; and (7) development of simple models for stability and response of wind turbines on flexible towers. E.A.K.

N83-22748*# Gilbert (Glen A.) and Associates, Inc., Reading, Pa.
PARAMETRIC ANALYSIS OF CLOSED CYCLE MAGNETOHYDRODYNAMIC (MHD) POWER PLANTS Final Report
W. Owens, R. Berg, R. Murthy, and J. Patten Sep. 1981 284 p refs
(Contracts DEN3-136; DE-AI01-77ET-10769)
(NASA-CR-165472; DOE/NASA/0136-1; NAS 1.26:165472) Avail: NTIS HC A13/MF A01 CSCL 10B

A parametric analysis of closed cycle MHD power plants was performed which studied the technical feasibility, associated capital cost, and cost of electricity for the direct combustion of coal or coal derived fuel. Three reference plants, differing primarily in the method of coal conversion utilized, were defined. Reference Plant 1 used direct coal fired combustion while Reference Plants 2 and 3 employed on site integrated gasifiers. Reference Plant 2 used a pressurized gasifier while Reference Plant 3 used a "state of the art' atmospheric gasifier. Thirty plant configurations were considered by using parametric variations from the Reference Plants. Parametric variations include the type of coal (Montana Rosebud or Illinois No. 6), clean up systems (hot or cold gas clean up), on or two stage atmospheric or pressurized direct fired coal combustors, and six different gasifier systems. Plant sizes ranged from 100 to 1000 MWe. Overall plant performance was calculated using two methodologies. In one task, the channel performance was assumed and the MHD topping cycle efficiencies were based on the assumed values. A second task involved rigorous calculations of channel performance (enthalpy extraction, isentropic efficiency and generator output) that verified the original (task one) assumptions. Closed cycle MHD capital costs were estimated for the task one plants; task two cost estimates were made for the channel and magnet only. S.L.

N83-22749*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TESTS OF AN ALTERNATING CURRENT PROPULSION SUBSYSTEM FOR ELECTRIC VEHICLES ON A ROAD LOAD SIMULATOR Final Report
Francis J. Stenger Dec. 1982 42 p refs
(Contract DE-AI01-77CS-51044)
(NASA-TM-83036; E-1479; DOE/NASA/51044-29; NAS 1.15:83036) Avail: NTIS HC A03/MF A01 CSCL 13F

The test results of a breadboard version of an ac electric-vehicle propulsion subsystem are presented. The breadboard was installed in the NASA Lewis Research Center Road Load Simulator facility and tested under steady-state and transient conditions. Steady-state tests were run to characterize the system and component efficiencies over the complete speed-torque range within the capability of the propulsion subsystem in the motoring mode of operation. Transient tests were performed to determine the energy consumption of the breadboard over the acceleration and cruise portions of SAE J227 and driving schedules B, C, and D. Tests in the regenerative mode were limited to the low-gear-speed range of the two speed transaxle used in the subsystem. The maximum steady-state subsystem efficiency observed for the breadboard was 81.5 percent in the high-gear-speed range in the motoring mode, and 76 percent in the regenerative braking mode (low gear). The subsystem energy efficiency during the transient tests ranged from 49.2 percent for schedule B to 68.4 percent for Schedule D. M.G.

N83-22750*# Gulf Research and Development Co., Pittsburgh, Pa. Chemicals and Minerals Div.
FUEL QUALITY-PROCESSING STUDY. VOLUME 1: OVERVIEW AND RESULTS Final Report
George E. Jones, Jr. May 1982 66 p 4 Vol.
(Contracts DEN3-175; DE-AJ01-77ET-13111)
(NASA-CR-165326-Vol-1; DOE/NASA/DEN-175-1-Vol-1; NAS 1.26:165326-Vol-1; GR/DC-625RN209-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 10B

The methods whereby the intermediate results were obtained are outlined, and the evaluation of the feasible paths from liquid fossil fuel sources to generated electricity is presented. The segments from which these paths were built are the results from the fuel upgrading schemes, on-site treatments, and exhaust gas treatments detailed in the subsequent volumes. The salient cost and quality parameters are included. Author

N83-22751*# Gulf Research and Development Co., Pittsburgh, Pa. Chemicals and Minerals Div.
FUEL QUALITY-PROCESSING STUDY. VOLUME 2: LITERATURE SURVEY Final Report

George E. Jones, Jr., R. Amero, B. Murthy, and M. Cutrone Oct. 1981 147 p refs 4 Vol.
(Contracts DEN3-175; DE-AJ01-77ET-13111)
(NASA-CR-165326-Vol-2; DOE/NASA/DEN-175-1-Vol-2; NAS 1.26:165326-Vol-2; GRDC-625RL137-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 10B

The validity of initial assumptions about raw materials choices and relevant upgrading processing options was confirmed. The literature survey also served to define the on-site (at the turbine location) options for fuel treatment and exhaust gas treatment. The literature survey also contains a substantial compilation of specification and physical property information about liquid fuel products relevant to industrial gas turbines. Author

N83-22752# Committee on Energy and Commerce (U. S. House).
COGENERATION AND SMALL POWER PRODUCTION
Washington GPO 1982 383 p refs Hearing on H.R. 6500 before the Subcomm. on Energy Conserv. and Power of the Comm. on Energy and Com., 97th Congr., 2d Sess., 15 Jun. 1982
(GPO-99-464) Avail: Subcommittee on Energy Conservation and Power

A Federal legal presumption in favor of the avoided cost rule to govern purchases by utilities from qualifying cogeneration and small power production facilities is proposed. States and nonregulated utilities are authorized to deviated from this rate under certain conditions, and may continue to negotiate and agree to any rate for purchase. On interconnection, the bill would create a Federal duty among utilities to connect their facilities with those of qualifying facilities, subject of course, to the requirement that these facilities pick up the costs for that interconnection. S.L.

N83-22753# Committee on Energy and Natural Resources (U.S. Senate).
WORLD PETROLEUM OUTLOOK, 1982
Washington GPO 1982 181 p Hearing before the Comm. on Energy and Natural Resources, 97th Congr., 2d Sess., 23 Apr. 1982
(GPO-95-066) Avail: Committee on Energy and Natural Resources

The world petroleum outlook is discussed. The near-term outlook for international supplies of oil are reviewed, and various factors which may affect this supply are explored. Author

N83-22754*# Gulf Research and Development Co., Pittsburgh, Pa. Chemical and Minerals Div.
FUEL QUALITY/PROCESSING STUDY. VOLUME 3: FUEL UPGRADING STUDIES Final Report
George E. Jones, Jr., P. Bruggink, and C. Sinnett Oct. 1981 195 p refs
(Contracts DEN3-175; DE-AI01-71ET-13111)
(NASA-CR-165326-Vol-3; DOE/NASA/DEN-175-1-Vol-3; NAS 1.26:165326-Vol-3; GRDC-625-RL-153-Vol-3) Avail: NTIS HC A09/MF A01 CSCL 10B

The methods used to calculate the refinery selling prices for the turbine fuels of low quality are described. Detailed descriptions and economics of the upgrading schemes are included. These descriptions include flow diagrams showing the interconnection between processes and the stream flows involved. Each scheme is in a complete, integrated, stand alone facility. Except for the purchase of electricity and water, each scheme provides its own fuel and manufactures, when appropriate, its own hydrogen. S.L.

N83-22755*# Gulf Research and Development Co., Pittsburgh, Pa. Chemicals and Materials Div.
FUEL QUALITY/PROCESSING STUDY. VOLUME 4: ON SITE PROCESSING STUDIES Final Report
George E. Jones, Jr., M. Cutrone, H. Doering, and J. Hickey Oct. 1981 104 p refs
(Contracts DEN3-175; DE-AI01-77ET-13111)
(NASA-CR-165326-Vol-4; DOE/NASA/DEN-175-1-Vol-4; NAS 1.26:165326-Vol-4; GRDC-625-RL-154-Vol-4) Avail: NTIS HC A06/MF A01 CSCL 10B

Fuel treated at the turbine and the turbine exhaust gas processed at the turbine site are studied. Fuel treatments protect the turbine from contaminants or impurities either in the upgrading fuel as produced or picked up by the fuel during normal transportation. Exhaust gas treatments provide for the reduction of NOx and SOx to environmentally acceptable levels. The impact of fuel quality upon turbine maintenance and deterioration is considered. On site costs include not only the fuel treatment costs as such, but also incremental costs incurred by the turbine operator if a turbine fuel of low quality is not acceptably upgraded. S.L.

N83-22756*# TRW Space Technology Labs., Redondo Beach, Calif.
STUDY OF SOLAR ARRAY SWITCHING POWER MANAGEMENT TECHNOLOGY FOR SPACE POWER SYSTEM Final Report
John E. Cassinelli Sep. 1982 240 p refs
(Contract NAS3-22656)
(NASA-CR-167890; NAS 1.26:167890; TRW-3724) Avail: NTIS HC A11/MF A01 CSCL 10A

This report documents work performed on the Solar Array Switching Power Management Study. Mission characteristics for three missions were defined to the depth necessary to determine their power management requirements. Solar array switching concepts which could satisfy the mission requirements were identified. The switching concepts were compared with a conventional buck regulator system for cost, weight and volume, reliability, efficiency and thermal control. Solar array switching provided significant advantages in all areas of comparison for the reviewed missions. E.A.K.

N83-22757*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE EFFECT OF CELL DESIGN AND TEST CRITERIA ON THE SERIES/PARALLEL PERFORMANCE OF NICKEL CADMIUM CELLS AND BATTERIES
Gerald Halpert and Donald A. Webb (McDonnell Douglas Corp.) Jan. 1983 40 p Presented at the 162nd Meeting of the Electrochem. Soc., Detroit, 20 Oct. 1982
(NASA-TM-84967; NAS 1.15:84967) Avail: NTIS HC A03/MF A01 CSCL 10C

Three batteries were operated in parallel from a common bus during charge and discharge. SMM utilized NASA Standard 20AH cells and batteries, and LANDSAT-D NASA 50AH cells and batteries of a similar design. Each battery consisted of 22 series connected cells providing the nominal 28V bus. The three batteries were charged in parallel using the voltage limit/current taper mode wherein the voltage limit was temperature compensated. Discharge occurred on the demand of the spacecraft instruments and electronics. Both flights were planned for three to five year missions. The series/parallel configuration of cells and batteries for the 3-5 yr mission required a well controlled product with built-in reliability and uniformity. Examples of how component, cell and battery selection methods affect the uniformity of the series/parallel operation of the batteries both in testing and in flight are given. Author

N83-22758# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
COMPRESSED-AIR ENERGY STORAGE PRELIMINARY DESIGN AND SITE DEVELOPMENT PROGRAM IN AN AQUIFER. VOLUME 5, PART 2, APPENDIX F: DYNAMIC SYSTEM COMPUTER MODEL Final Report
P. A. Berman, J. S. Bonk, W. F. Kobett, N. S. Kosanovich, L. J. Long, and D. J. Marinacci Nov. 1982 508 p Sponsored in part by EPRI Prepared in cooperation with Public Service Co. of Indiana, Plainfield
(Contract DE-AC02-78ET-29232; EPRI Proj. 1081-3)
(DE83-004004; EPRI-EM-2351-Vol-5-Pt-2) Avail: NTIS HC A22/MF A01

The turbomachinery design was addressed as part of a study which examined an aquifer based compressed air energy storage (CAES) plant. The computer program and subroutines written to provide a general purpose modeling tool for a CAES power plant system are documented. The CAES plant was modeled using

FORTRAN and a Control Data Corporation 7600 digital computer. The system model was developed to: determine the transient response characteristics of the complete CAES plant; provide a tool for evaluating the requirements and performance of control systems proposed for the CAES plant; provide a general purpose digital computer based dynamic modeling tool; and provide power plant component models as FORTRAN subroutines that can be used, with appropriate parameter data, as modules in complete CAES power plant models. DOE

N83-22759# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
COMPRESSED-AIR ENERGY STORAGE PRELIMINARY DESIGN AND SITE DEVELOPMENT PROGRAM IN AN AQUIFER. VOLUME 5, PART 1: TURBOMACHINERY DESIGN Final Report
P. A. Berman, J. S. Bonk, W. F. Kobett, N. S. Kosanovich, L. J. Long, and D. J. Marinacci Nov. 1982 564 p Sponsored in part by EPRI Prepared in cooperation with Public Service Co. of Indiana, Inc., Plainfield
(Contract DE-AC02-78ET-29232; EPRI Proj. 1081-3)
(DE83-004005; EPRI-EM-2351-Vol-5-Pt-1) Avail: NTIS HC A24/MF A01

The development of the design approach for a combustion turbine heat cycle and the major mechanical equipment for use by an electric utility at a selected aquifer air storage site is documented. A compressed air energy storage (CAES) system utilizes off peak electric power, available from base load power plants, to store compressed air underground in an aquifer. During subsequent periods, the stored air is extracted from the aquifer and used as an air supply for a generating combustion turbine expander. The aquifer has an initial discovery pressure of 840 psia. An initial air injection temperature of 1500 F was selected. The major mechanical equipment considered includes: the turbine motor/generator compressor train, intercooler and aftercooler system, and the exhaust gas regenerator. The cycle and machinery configuration and the specific mechanical equipment were selected for their Media site characteristics. These characteristics and the effect of component interdependency are considered when a conservative component design approach is established which satisfies the Media site CAES system requirements. DOE

N83-22760# University of South Florida, St. Petersburg. Dept. of Marine Science.
WORKSHOP REPORT ON BASIC RESEARCH IN ORGANIC GEOCHEMISTRY APPLIED TO NATIONAL ENERGY NEEDS
Jan. 1982 129 p refs Workshop held in St. Petersburg, Fla., 15-17 Dec. 1980; sponsored by NAS-NRC and DOE Sponsored by DOE
(DE82-007074; CONF-801249) Avail: NTIS HC A07/MF A01

Basic research is carried out in basic geochemistry as it relates to the country's energy needs. The exploration, exploitation and environmental impact problems associated with the production and utilization of natural and synthetic carbonaceous fuels are discussed. Recommendations are given for these problems. For individual titles, see N83-22761 through N83-22768.

N83-22761# University of South Florida, St. Petersburg.
SUMMARY OF RECOMMENDATIONS ON BASIC RESEARCH
In its Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 p 1-8 (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

There has been considerable progress during the past four decades in organic geochemistry research applied to understanding the origin of coal, oil, and gas, and in understanding contemporary and ancient carbon cycles on Earth. Significant contributions have been made by academic research, government laboratories, and industrial research communities either working independently or with informal cooperation. But, important questions still remain. Among the questions answered in this paper are those dealing with the mechanisms of migration of hydrocarbons and the structure of kerogen and coal. During the final plenary session of the workshop, one way of dealing with the problem of coordinating basic research effects between industry, academic institutions, and government laboratories, strongly favored by some of the participants, was discussed--creation of a National Fossil Fuel Research Institute. Author

N83-22762# Geological Survey, Menlo Park, Calif.
EXPLORATION DELIBERATIONS
Wolfgang Stahl (Federal Inst. on Geoscience and Natural Resources) and Keith Kvenvolden *In* Univ. South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 p 9-16 refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

Of the many directions that organic geochemistry could take relative to the solution of problems in petroleum exploration, three appear to have the greatest promise. Basic organic geochemical research in the areas of migration, kerogen, and depositional model systems should yield the most significant results relative to national energy needs. Migration of petroleum is one of the least understood phenomena in petroleum geology. New information in this area should increase the ability of explorationists to predict where petroleum has moved in the subsurface and where it now resides. Kerogen is the dispersed, insoluble organic matter in sedimentary rocks that is a basic substance in petroleum generation. Increased knowledge of its origin, composition, and alteration could be particularly valuable to explorationists. Depositional model systems combine the geologic framework with petroleum geochemistry to yield predictive models for understanding petroleum occurrence. Author

N83-22763# Shell Development Co., Houston, Tex.
EXPLOITATION DELIBERATIONS
John R. Castano *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 p 17-20 (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

Responsible exploitation of our natural carbonaceous fuels must necessarily be founded in basic organic geochemical research. The greatest impact could be made by directing basic research towards three important areas: (1) the chemical structure of coal; (2) the non-thermal recovery of oil from heavy oil sands; and (3) the utilization of soil shale. These research areas are discussed in detail. B.W.

N83-22764# Woods Hole Oceanographic Institution, Mass.
ENVIRONMENTAL IMPACT DELIBERATIONS
John W. Farrington *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 p 21-32 refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

Many of the known and potential chemical pollutants released to the environment during the various phases of exploration, exploitation, and use of energy resources are organic chemicals. A complex variety of naturally occurring organic compounds are also a key part of the carbon cycle in the contemporary environment. Understanding the response of the global carbon cycle to CO_2 increases in the atmosphere from fossil fuel combustion will depend, in part, on understanding the organic matter in the carbon cycle. Early in the deliberations it was concluded that the present goals of organic geochemistry research in area of environmental impacts are: (1) to provide knowledge of the important factors in the critical pathways of pollutants to man and living, natural resources; and (2) to provide a better understanding of the biogeochemical cycles of carbon and other elements. An important recurrent theme throughout the deliberations was the recognition that much of the environmental impact research needed in organic geochemistry was the same or similar in fundamental approach to that needed for inorganic chemicals. B.W.

N83-22765# Woods Hole Oceanographic Institution, Mass.
PROBLEMS IN ORGANIC GEOCHEMISTRY APPLIED TO PE-

TROLEUM EXPLORATION AND PRODUCTION
John M. Hunt *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 33 p refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

This overview is an outline of some areas where basic studies are needed to improve the discovery and utilization of oil and gas. Topics discussed include hydrocarbon detection, sediments, gas origin, gas seepage and sea water analysis. B.W.

N83-22766# California Univ., Livermore. Lawrence Livermore Lab.
UTILIZATION OF OIL SHALES AND BASIC RESEARCH IN ORGANIC GEOCHEMISTRY
Alan K. Burnham *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 10 p refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

Summarized are current research needs relating to oil shale utilization which might also provide new insight into the organic geochemistry of the Green River formation. There are two general topics which cross boundaries and are particularly worthy of emphasis. The first is a study of changes in the kerogen structure and biological markers with depth and location, and how these changes affect the pyrolysis products. This information would be particularly useful to the retort diagnostic methods. It might also lead to a better chemical reaction model of diagenesis and metagenesis. The second is a study of the heteroatom chemistry of the kerogen and how it relates to mineral matter and trace metals. This would be useful not only to present utilization methods, but also might suggest new nonthermal methods of organic material recovery. B.W.

N83-22767# Pennsylvania State Univ., University Park. Coll. of Earth and Mineral Sciences.
THE RELEVANCE OF COAL GEOCHEMISTRY TO COAL UTILIZATION
P. H. Given *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 26 p refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

In the earlier part of this review, it was pointed out that a diversity of coal characteristics was to be expected because of the existence of many different environments of deposition, the material contributions from many different floristic assemblages, and the widely differing temperature/time/pressure histories. It is already clear that the coals found within the geographic area of the United States of America do indeed constitute a widely diverse set of materials. However, the findings discussed in the previous section strongly suggest that all present classification systems are inadequate, and that both the science and technology of coal urgently need a new classification that inevitably must be based on geology and geochemistry. It is in distinguishing the geochemistry of various groups of coals that the analysis of soluble biological markers may be valuable. Differences in the distribution of these molecules may be related to the character of environments of deposition and so provide important clues to the personalities of the insoluble matter in coals. B.W.

N83-22768# Department of Energy, Pittsburgh, Pa. Energy Technology Center.
CONVERSION OF COAL TO SYNTHETIC FUELS
Bernard D. Blaustein *In* Univ. of South Florida Workshop Rept. on Basic Res. in Org. Geochem. Appl. to Natl. Energy Needs Jan. 1982 11 p refs (For primary document see N83-22760 12-44)
Avail: NTIS HC A07/MF A01

In 1979, almost one-half of U.S. energy supplies was from oil. Our need for liquid fuels, together with our dependence on imported oil, has greatly increased interest in producing synthetic fuels from coal, of which we have large reserves. This paper discusses the various routes available to produce synfuels from coal. Author

N83-22769# Pacific Gas and Electric Co., San Francisco, Calif.
DEVELOPMENT OF THE UTILIZATION OF COMBUSTIBLE GAS PRODUCED IN EXISTING SANITARY LANDFILLS: EFFECTS OF CORROSION AT THE MOUNTAIN VIEW, CALIFORNIA LANDFILL GAS-RECOVERY PLANT
Oct. 1982 64 p refs
(Contract DE-FG01-79CS-20291)
(DE83-001576; DOE/CS-20291/3) Avail: NTIS HC A04/MF A01

Corrosion of equipment has occurred at the Mountain View, California Landfill Gas Recovery Plant. Corrosion is most severe on compressor valve seats and cages, tubes in the first and second stages of the interstage gas cooler, and first and second stage piping and liquid separators. Corrosion occurs because the raw landfill gas contains water, carbon dioxide, and oxygen. Some corrosion may also result from trace concentrations of organic acids present in the landfill gas. Corrosion of the third stage compressor, cooler, and piping does not occur because the gas is dehydrated immediately prior to the third stage. Controlling corrosion is necessary to maintain the mechanical integrity of the plant and to keep the cost of the gas competitive with natural gas. Attempts to reduce corrosion rates by injecting a chemical inhibitor have proved only partially successful. Recommendations for dealing with corrosion include earlier dehydration of the gas, selection of special alloys in critical locations, chemical inhibition, and regular plant inspections. DOE

N83-22770# Brookhaven National Lab., Upton, N. Y.
NICKEL-ZINC BATTERIES
James McBreen, B. D. McNicol, ed., and D. A. J. Rand, ed. Jul. 1982 35 p refs Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE83-000208; BNL-31729) Avail: NTIS HC A03/MF A01

A review of the design, components, electrochemistry, operation and performance of nickel-zinc batteries is presented. DOE

N83-22771# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research.
FUEL-CELL TECHNOLOGY ASSESSMENT. VOLUME 2: EVALUATION OF JAPAN
V. Robert Latorre and Leo R. Spogen, Jr. 15 Aug. 1982 32 p 5 Vol.
(Contract W-7405-eng-48)
(DE83-004146; UCID-19412-Vol-2) Avail: NTIS HC A03/MF A01

The potential for US fuel cell technology in selected countries was evaluated. The results of the evaluations and the pertinent factors which influenced their outcome are given. Data for Japan is given. DOE

N83-22772# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research.
FUEL-CELL TECHNOLOGY ASSESSMENT. VOLUME 3: EVALUATION OF TUNISIA
V. Robert Latorre and Leo R. Spogen, Jr. 15 Aug. 1982 27 p 5 Vol.
(Contract W-7405-eng-48)
(DE83-004294; UCID-19412-Vol-3) Avail: NTIS HC A03/MF A01

The potential for US fuel cell technology in selected countries was evaluated. The results of the evaluations and the pertinent factors which influenced their outcome are given. Data for Tunisia is given. DOE

N83-22773# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research.
FUEL-CELL TECHNOLOGY ASSESSMENT. VOLUME 5: EVALUATION OF SOUTH KOREA
V. Robert Latorre and Leo R. Spogen, Jr. 15 Aug. 1982 24 p 5 Vol.
(Contract W-7405-eng-48)
(DE83-004299; UCID-19412-Vol-5) Avail: NTIS HC A02/MF A01

The potential for US fuel cell technology in selected countries was evaluated. The results of the evaluations and the pertinent factors which influenced their outcome are given. The report is in five volumes. Data for South Korea is given. DOE

N83-22774# Sandia Labs., Albuquerque, N. Mex.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT: VOLUME 5, FOR BEVERLY HIGH SCHOOL, BEVERLY, MASS.
Feb. 1982 30 p Prepared in cooperation with Boeing Computer Services, Inc., Seattle
(Contract DE-AC04-76DP-00789)
(DE82-012058; SAND-81-7088/5) Avail: NTIS HC A03/MF A01

Performance data for the month of January, 1982 for a grid connected photovoltaic power supply in Massachusetts are presented. Data include: monthly and daily electrical energy produced; monthly and daily solar energy incident on the array; monthly and daily array efficiency; plots of energy produced as a function of power level, voltage, cell temperature and time of day; power conditioner input, output and efficiency for each of two individual units and for the total power conditioning system; photovoltaic system efficiency; capacity factor; PV system to load and grid to load energies and corresponding dollar values; daily energy supplies to the load by the PV system; daily PV system availability; monthly and hourly insolation; monthly and hourly temperature average; monthly and hourly wind speed; wind direction distribution; average heating and cooling degree days; number of freeze/thaw cycles; and the data acquisition mode and recording interval plot. GRA

N83-22775# Los Alamos Scientific Lab., N. Mex.
RECOVERY OF GAS FROM HYDRATE DEPOSITS USING CONVENTIONAL PRODUCTION TECHNOLOGY
P. L. McGuire 1982 8 p refs Presented at Unconventional Gas Recovery Symp., Pittsburg, Pa., 16 May 1982
(Contract W-7405-eng-36)
(DE82-008106; LA-UR-82-518; CONF-820524-3) Avail: NTIS HC A02/MF A01

Methane hydrate gas could be a sizeable energy resource if methods can be devised to produce this gas economically. This paper examines two methods of producing gas from hydrate deposits by the injection of hot water or steam, and also examines the feasibility of hydraulic fracturing and pressure reduction as a hydrate gas production technique. A hydraulic fracturing technique suitable for hydrate reservoirs is also described. DOE

N83-22776# Sandia Labs., Albuquerque, N. Mex. Experimental Systems Operations Div.
PROGRAM FOR PREDICTING THERMAL PERFORMANCE BASED ON TEST DATA OF LOW- TO MEDIUM-TEMPERATURE LINE-FOCUSING, CONCENTRATING SOLAR COLLECTORS
Thomas D. Harrison Feb. 1982 20 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012605; SAND-82-0092/1) Avail: NTIS HC A02/MF A01

A program for predicting the performance of line focusing solar collectors that can be used in low to medium temperature applications such as domestic water heaters is described. The program has two purposes: (1) to make predictions of thermal performance in various locations and (2) to provide manufacturers of each collector with an opportunity to determine the effectiveness of design changes of their choosing. The testing program is outlined. The computer program for performance predictions is described. DOE

N83-22777# Sandia Labs., Albuquerque, N. Mex. Photovoltaic Concentrator Technology Div.
THERMAL-RECEIVER DESIGNS FOR LINE-FOCUS SOLAR COLLECTORS
Clement J. Chiang Feb. 1982 14 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012067; SAND-81-1862) Avail: NTIS HC A02/MF A01

The potential to increase the annual efficiency of line focus collectors by reducing receiver heat loss was studied. Five alternate receiver designs are compared with a standard design. The comparison is based on annual collector field efficiency using optimized receiver designs. It is found that the all-glass design and the cavity design provide the greatest increases in efficiency. Average fluid temperatures range from 200 to 450 C. DOE

N83-22778# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
BENCH-SCALE STUDIES OF BIOMASS LIQUEFACTION WITH PRIOR HYDROLYSIS
S. Ergun and N. Yaghoubzadeh Feb. 1982 67 p refs
(Contract W-7405-eng-48)
(DE82-012343; LBL-12543) Avail: NTIS HC A04/MF A01

The liquefaction experiments were conducted batchwise using autoclaves. The oils produced in batch experiments were poor in quality, i.e., they solidified at room temperature and contained excessive amounts of acetone insoluble material, compared to oils produced in flow mode at the biomass liquefaction test facility at Albany, Oregon and in the process evaluation unit of Lawrence Berkeley Laboratory. Possible causes of the difference in the quality and yields of oils are differences in the synthesis gas pressure initially imposed, and the rate of heating to the reaction temperature during which irreversible reactions can take place, as well as differences in gas/liquid contacting. DOE

N83-22779# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
MANAGEMENT DECISIONS FOR COGENERATION Executive Summary
Robert R. Radcliffe and Richard D. Tabors Jul. 1982 40 p refs
(Contract DE-AM01-76EI-02295)
(DE83-002482; MIT-EL-82-034) Avail: NTIS HC A03/MF A01

Two interdependent studies which explore the underlying factors in the decision by private, private non-profit, and public sector facility owners to invest in cogeneration technology are summarized. The employ factor analysis techniques to explain the decision to invest and discriminant analysis to group the survey respondents into non-cogenerators and potential cogenerators. Data for both studies come from a survey of commercial, industrial, and institutional electric energy consumers who used more than 750 kW demand in any one month of 1981 for a selected electric utility in the Boston area. There were 129 usable responses to the survey of 32.2% of the population. The studies confirm that a number of factors other than purely economic considerations may prevent use of cogeneration technology at the present time. These factors include: uncertainty caused by regulatory action; desire for energy self sufficiency by the organization; financial flexibility; experience with electricity cogeneration or self generation; and capital budget planning methods. DOE

N83-22780# Stapenhorst (F. W. E.), Inc., Pointe Claire (Quebec).
DOE SMALL-SCALE HYDROELECTRIC DEMONSTRATION PROGRAM. F. W. E. STAPENHORST, INC., GOODYEAR LAKE HYDROELECTRIC-GENERATING-STATION REDEVELOPMENT Annual Report, 11 Aug. 1981 - 10 Aug. 1982
1982 215 p refs
(Contract DE-FC07-79RA-23211)
(DE83-003156; DOE/RA-23211/3; AR-2) Avail: NTIS HC A10/MF A01

Monthly and year long data on the performance, maintenance, power generation, flow conditions, and operating costs during the period from August 11, 1981 to August 10, 1982 at the Goodyear Lake (New York) small-scale hydroelectric power plant are presented. During this period the plant generated 5,806,500 kWh of power for a total income of $194.401, which represents approximately 79% of predicted values. The shortfall in output resulted from the failure of Generator Unit No. 1 which was out of operation for two months. DOE

N83-22781# California Univ., Berkeley. Lawrence Berkeley Lab. Solar Energy Program.
METHODS FOR EVALUATING THE DOE APPROPRIATE-TECHNOLOGY PROGRAM: A REVIEW AND COMPILATION OF EVALUATION METHODS
Bart Lucarelli Jul. 1982 85 p refs
(Contract DE-AC03-76SF-00098)
(DE83-003306; LBL-14782) Avail: NTIS HC A05/MF A01

Procedures for evaluating the energy impact of renewable energy resource projects funded by the appropriate technology

(AT) program are described. A discussion of the various evaluation approaches used by LBL over the past 2 years, definitions of key concepts such as direct and indirect energy impact and cost effectiveness, and recommendations of a simplified evaluation approach for the future are included. Procedures for evaluating the direct energy impact from six renewable energy resource systems are: (1) wind electric; (2) hydroelectric; (3) anaerobic digestion; (4) active solar water and space heating; (5) passive solar; and (6) geothermal space and water heating as well as weatherization. Economic concepts and simplified approach for computing the cost effectiveness of small energy projects are defined. DOE

N83-22782# Delaware Div. of Facilities Management, Dover.
GEOTHERMAL ENERGY: TOMORROW'S ALTERNATIVE TODAY. A HANDBOOK FOR GEOTHERMAL-ENERGY DEVELOPMENT IN DELAWARE
John Mancus and Emily Perrone Aug. 1982 117 p refs
(Contract DE-FG01-80RA-50091)
(DE83-002987; DOE/RA-50091/T1) Avail: NTIS HC A06/MF A01

A general procedure guide to various technical, economic, and institutional aspects of geothermal development in Delaware is given. The following are covered: geothermal as an alternative, resource characteristics, geology, well mechanics and pumping systems, fluid disposal, direct heat utilization-feasibility, environmental and legal issues, permits and regulations, finance and taxation, and steps necessary for geothermal development. DOE

N83-22783# CACI, Inc. - Federal, San Diego, Calif.
PRODUCTION COSTING OF AN ADVANCED/INNOVATIVE WIND ENERGY CONCEPT (AIWEC): EXTENSION OF THE SAMICS METHODOLOGY
Bruce Kleine and John C. Callahan Nov. 1982 138 p
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-003085; SERI/TR-98282-2) Avail: NTIS HC A07/MF A01

The Standard Assembly-line Manufacturing Industry Costing Standards (SAMICS) were designed as a tool for estimating the price of a manufactured product based on an assembly-line production facility. The cost of products such as the McDonnell Douglass 40-kW Giromill, which cannot be manufactured on an assembly line in small quantities, could not be analyzed using the standard SAMICS methodology. To analyze the cost of such products using SAMICS, it was necessary to adapt the standard methodology for application to a job shop configuration. The resulting methodology extension is reported. DOE

N83-22784# Energy Research and Development International, Inc., Pittsburgh, Pa.
DYNAMIC INTERACTION BETWEEN AN OTEC POWER PLANT AND A POWER GRID Final Report
31 Aug. 1982 141 p refs
(Contract DE-AC02-80RA-50274)
(DE83-002862; DOE/RA-50274/1) Avail: NTIS HC A07/MF A01

The objectives of the research reported are: to identify and resolve potential technical problems that may arise from the incorporation of an OTEC power plant in the existing generation mix of Puerto Rico and to develop the tools and to identify the technical resources needed for dynamic analysis of island power systems to which OTEC power plants provide a substantial portion of the load demand. The issues addressed are system modeling and data gathering, network simplification, selection of OTEC plant site and power system, stability analysis, and economic dispatch when OTEC power plants contribute substantially to the island's load. The slow dynamics of the OTEC plant make it a reference for the rest of the power system during a transient, but this slowness is a drawback in terms of system recovery from fault-induced transients. It is found that simple dynamic models can, in most instances, describe the transient behavior of both the OTEC plant and the island's power system, but it was not possible to reduce the non-OTEC portion of the power system to a single generation point and a single load. DOE

N83-22785# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
PARAMETRIC INVESTIGATIONS AND OTHER RELATED STUDIES OF ENERGY STORAGE TYPE CAPACITORS Quarterly Report
W. E. Packer, B. Abdurashid, R. C. Dahlgren, J. R. Reynolds, and N. A. Sidnell 1 Dec. 1982 33 p
(Contract DE-AC04-76DP-00656)
(DE83-003426; GEPP-TIS-696) Avail: NTIS HC A03/MF A01

Studies on energy storage capacitors were made to: evaluate the effect that processing temperatures have on voltage breakdown; evaluate three alternatives to the mica-filled epoxy encapsulant; improve winding techniques for multisection capacitors; evaluate the use of doubly metallized capacitor films; and develop standard practice guides for capacitor parameters. DOE

N83-22786# Sandia Labs., Albuquerque, N. Mex. Experimental Facilities.
ENERGY-TRANSMISSION-SYSTEM HEAT LOSSES
Robert D. Meyer Oct. 1982 67 p refs
(Contract DE-AC04-76DP-00789)
(DE83-003628; SAND-82-1138) Avail: NTIS HC A04/MF A01

A series of heat loss experiments was performed to determine the relative contribution of various components in thermal energy and transport storage systems. The items evaluated include pipe insulation, control and hand valves, flex hoses, various pipe geometries, and storage tanks. These data were collected in conjunction with thermal solar energy experiments but are applicable to many other types of heat transport systems. DOE

N83-22787# Westinghouse Research and Development Center, Pittsburgh, Pa.
EVALUATION OF GASIFICATION AND GAS CLEANUP PROCESSES FOR USE IN MOLTEN CARBONATE FUEL CELL POWER PLANTS Final Report
G. Jablonski, J. R. Hamm, M. A. Alvin, R. A. Wenglarz, and P. Patel 1982 497 p refs
(Contract DE-AC21-81MC-16220)
(DE83-003821; DOE/MC-16220/1306) Avail: NTIS HC A21/MF A01

Coal gasifiers and gas cleanup systems suitable for supplying fuel to molten carbonate fuel cells (MCFC) in industrial and utility power plants are listed. Those coal gas cleanup systems rejected by DOE's MCFC contractors for their power plant systems by virtue of the resources required for those systems to be commercially developed are characterized. An analytical model to predict MCFC tolerance for particulates on the anode (fuel gas) side of the MCFC was developed. An analytical model to predict MCFC anode side tolerance for chemical species, including sulfides, halogens, and trace heavy metals was developed. The candidate gasifier/cleanup systems those most suitable for MCFC-based power plants are discussed. A reference wet cleanup system parametric analyses of the coal gasifiers and gas cleanup systems efficiency, investment, cost of electricity, operability, and environmental effect rankings, and a final report are discussed. DOE

N83-22788# JBF Scientific Corp., Wilmington, Mass.
ASSESSMENT OF DISTRIBUTED PHOTOVOLTAIC ELECTRIC-POWER SYSTEMS Final Report
R. W. Neal, P. F. DeDuck, and R. N. Marshall Oct. 1982 377 p refs Sponsored by EPRI
(EPRI Proj. 1192-1)
(DE83-900566; EPRI-AP-2687) Avail: NTIS HC A17/MF A01

A methodology for assessing the potential impacts of distributed photovoltaic (PV) systems on electric utility systems, including subtransmission and distribution networks, and the application of that methodology to several illustrative examples are discussed. The investigations focused upon five utilities. Impacts upon utility system operations and generation mix were assessed using accepted utility planning methods in combination with models that simulate PV system performance and life-cycle economics. Impacts on the utility subtransmission and distribution systems were also investigated. The economic potential of distributed PV systems

was investigated for ownership by the utility as well as by the individual utility customer. Presented are the methods that were developed for the study, the approach used to define preferred PV systems that could minimize the cost of energy, quantitative results for the case studies, and conclusions based on these results. DOE

N83-22789# Washington State Univ., Pullman. Geological Engineering Sect.
LOW-TEMPERATURE GEOTHERMAL RESOURCE AND STRATIGRAPHY OF PORTIONS OF YAKIMA COUNTY, WASHINGTON M.S. Thesis
John Biggane 30 Jul. 1982 146 p refs Sponsored in part by the Washington State Dept. of Natural Resources
(Contract DE-AC07-79ET-27014)
(DE83-001433; DOE/ET-27014/T2; WSU-82/15-7; WDGER-OP-82-6) Avail: NTIS HC A07/MF A01

The low temperature geothermal resource of portions of Yakima County, south central Washington, is defined by several least squares linear regression analyses of bottom hole temperature and depth data. Bottom hole temperature and depth data were separated into fourteen well data groups based on geographic proximity, land slope azimuth, and position within the regional ground water flow system. The depths of these wells range from over 50m to almost 600m. The regression analyses of these well data groups indicate that the projected land surface temperature and geothermal gradient range from 10.6 to 14.00C and from 24.9 to 52.20C/km, respectively. Stratigraphic correlation diagrams developed from borehole geophysical and lithologic logs are given for localities within the lower Yakima, Black Rock, Moxee, Ahtanum, Cowiche, and Naches valleys. These correlation diagrams are combined with their respective borehole temperature logs and well data group predicted temperature curves to assess the validity of the regression analyses and to determine aquifer locations, temperatures, and directions of intra-borehole flow. DOE

N83-22790# Geological Survey, Lawrence, Kans.
ASSESSMENT OF THE GEOTHERMAL RESOURCES OF KANSAS Final Report
Don W. Steeples, ed. and Sandra A. Stavnes, ed. Jun. 1982 83 p refs
(Grants DE-AS07-79ET-27204; AT(49-24)-0256; DI-14-08-001-G-137)
(DE83-003234; DOE/ET-27204/T1-Vol-1-Sect-1) Avail: NTIS HC A05/MF A01

The following regional geological and geophysical studies are reported: establishment of a geothermal gradient data base from approximately 45,000 bottom hole temperatures recorded from well logs and interpretation of this data in terms of regional geology and establishment and interpretation of a second data base of geothermal gradients from thermal logging data from 144 holes of opportunity in the state. DOE

N83-22791# Research Triangle Inst., Research Triangle Park, N.C.
PHOTOVOLTAIC CELL AND MODULE STATUS ASSESSMENT. VOLUME 1: TECHNOLOGY OVERVIEW Final Report
J. W. Harrison Oct. 1982 110 p refs Sponsored by EPRI
(EPRI Proj. 1975-1)
(DE83-900567; EPRI-AP-2473-Vol-1) Avail: NTIS HC A06/MF A01

The current technology status of photovoltaic (PV) cells and modules is assessed. The path of development from research concept through intermediate stages, such as prototype development, to routine production is characterized by an increasing definition of physical form, function, performance and cost. At this time conversion efficiency is the most important measure of technical status in each of the development stages. Efficiency is used in this study as the primary comparative indicator. Over the near term, flat plate modules based on silicon PV cells will dominate commercial availability due to the extensive industrial experience with silicon and the emphasis placed on this material in the Federal program. Both silicon and gallium arsenide based cells with dominate concentrator module development and demonstration efforts are discussed. Many other materials and device designs are being pursued, but much remains to be done to bring efficiency and stability up to the levels demonstrated in the silicon and gallium arsenide devices for use in either flat plate or concentrator modules. DOE

N83-22792# Department of Energy, Oak Ridge, Tenn. Technical Information Center.
ENERGYGRAMS: BRIEF DESCRIPTIONS OF ENERGY TECHNOLOGY
W. F. Simpson, Jr., ed. 1982 100 p refs
(DE83-001868; DOE/TIC/EGC-82/3) Avail: NTIS HC A05/MF A01

This compilation of technical notes (called Energygrams) is published by the Technical Information Center. Energygrams are usually one-page illustrated bulletins describing DOE technology or data and telling how to obtain the technical reports or other material on which they are based. Frequently a personal contact is given who can provide program information in addition to the data found in the reports. The compilation is organized by subject categories, and, within each category, Energygrams are presented alphabetically by Energygram title. DOE

N83-22793# Colorado State Univ., Fort Collins.
METHANOL PRODUCTION FROM FERMENTOR OFF-GASES Final Report, 1 Jul. 1981 - 30 Jun. 1982
B. E. Dale and A. R. Moreira 1982 22 p refs
(Contract DE-FG07-81ID-12325)
(DE83-005011; DOE/ID-12325/4) Avail: NTIS HC A02/MF A01

The off gases from an acetone butanol fermentation facility are composed mainly of CO2 and H2. Such a gas stream is an ideal candidate as a feed to a methanol synthesis plant utilizing modern technology recently developed and known as the CDH-methanol process. A detailed economic analysis for the incremental cost of a methanol synthesis plant utilizing the off gases from an acetone butanol fermentation indicates a profitable rate of return of 25 to 30% under the most likely production conditions. Bench scale studies at different fermentor mixing rates indicate that the volume of gases released during the fermentation is a strong function of the agitation rate and point to a potential interaction between the volume of H2 evolved and the levels of butanol present in the final fermented broth. Such interaction may require establishing optimum operating conditions for an integrated butanol fermentation methanol synthesis plant. DOE

N83-22794# Alabama Univ., University. School of Mines and Energy Development.
AQUIFER THERMAL-ENERGY-STORAGE MODELING
Walter J. Schaetzle and Jerry Edward LeCroy Sep. 1982 99 p refs
(DE83-900672; NP-3900672) Avail: NTIS HC A05/MF A01

A model aquifer was constructed to simulate the operation of a full size aquifer. Instrumentation to evaluate the water flow and thermal energy storage was installed in the system. Numerous runs injecting warm water into a preconditioned uniform aquifer were made. Energy recoveries were evaluated and agree with comparisons of other limited available data. The model aquifer is simulated in a swimming pool, 18 ft by 4 ft, which was filled with sand. Temperature probes were installed in the system. A 2 ft thick aquifer is confined by two layers of polyethylene. Both the aquifer and overburden are sand. Four well configurations are available. The system description and original tests, including energy recovery, are described. DOE

N83-22795# Texas Univ., Austin. School of Architecture.
INTEGRATED PASSIVE-SOLAR DEMONSTRATION PROJECT Final Report
M. L. Garrison Sep. 1982 105 p refs Sponsored by State of Texas
(DE83-900807; TENRAC/EDF-081) Avail: NTIS HC A06/MF A01

The objectives were to collect data on a combination of several

passive solar heating and cooling systems. A passive solar test structure was constructed and monitored and the demonstration of passive systems designed into the structure was evaluated. Passive solar cooling principles include: shading all mass walls and windows from direct solar gain, maintaining cool attic and ceiling temperatures using solar induced ventilation, maintaining cool mean radiant wall temperatures, recirculating internal air, and using natural cross-ventilation throughthe conditioned space in spring and fall. Passive solar heating principles include: orientation of windows and sunspaces towards the south, providing double pane south windows, providing a double pane solar sunspace, using night insulation over glazing, extended thermal storge mass, and using a fan-forced rock/earth/air storage system. DOE

N83-22796# Burt, Hill, Kosar, Rittleman, and Associates, Butler, Pa. Research and Solar Applications Div.

AUTOMATED INSTALLATION METHODS FOR PHOTOVOLTAIC ARRAYS

R. Briggs, A. Daniels, R. Greenaway, J. Oster, Jr., D. Racki, and R. Stoeltzing Nov. 1982 232 p refs Prepared for Sandia Labs., Albuquerque, N. Mex.

(Contract DE-AC04-76DP-00789)

(DE83-004272; SAND-81-7192) Avail: NTIS HC A11/MF A01

Since installation expenses constitute a substantial portion of the cost of a large photovoltaic power system, methods for reduction of these costs were investigated. The installation of the photovoltaic arrays includes all areas, starting with site preparation (i.e., trenching, wiring, drainage, foundation installation, lightning protection, grounding and installation of the panel) and concluding with the termination of the bus at the power conditioner building. To identify the optimum combination of standard installation procedures and automated/mechanized techniques, the installation process was investigated including the equipment and hardware available, the photovoltaic array structure systems and interfaces, and the array field and site characteristics. Preliminary designs of hardware for both the standard installation method, the automated/mechanized method, and a mix of standard installation procedures and mechanized procedures were identified to determine which process effectively reduced installation costs. In addition, costs associated with each type of installation method and with the design, development and fabrication of new installation hardware were generated. DOE

N83-22797# Arizona Scientific Research, Tucson.

PERFORMANCE OPTIMIZATION OF THE ASR OPTICAL MODULE

Wally Meinel, Ed Meinel, and A. B. Meinel Nov. 1982 183 p

(Contract DE-AC04-76DP-00789)

(DE83-004477; SAND-82-7124) Avail: NTIS HC A09/MF A01

The design, construction, and testing of a photovoltaic concentrating collector module using a dish shaped reflector is described. The reflector is .83 meters in diameter and provides sunlight at a geometric concentration intensity of 50 suns to an actively cooled cyclindrical receiver. Six prototype modules were fabricated using reflectors made of a fiberglass reinforced plastic. The maximum electrical efficiency measured was 8.4 percent. Design considerations included the effects of reflector design, receiver size and location, reflective surface errors, alignment errors, and tracking errors on receiver flux distribution. Flux profiles were measured and the shape of the reflectors was determined by using an automated method. An estimate of the costs based on a production version of the design gave an installed energy cost of $3.42 per peak watt. DOE

N83-22798# Energy Technology Engineering Center, Canoga Park, Calif.

SOLAR-COLLECTOR SILICON HOSE LIFE TEST

H. F. Donohue and R. L. Morse 11 Aug. 1982 13 p

(Contract DE-AC03-76SF-00700)

(DE83-002236; ETEC-TDR-82-13) Avail: NTIS HC A02/MF A01

A life-cycle test of the recommended silicone hose installation was performed to verify that this configuration would protect the integrity of the system. The test rig was filled with inhibited water which was circulated through the test article. The water was alternately heated and pressurized and then cooled to simulate day and night operation in Arizona. The test indicated that the recommended modification would provide an economic and long-range solution to the problem. DOE

N83-22799# EIC, Inc., Newton, Mass.

USE OF INORGANIC MATERIALS FOR PHOSPHORESCENT CONCENTRATING SOLAR CELLS

P. O'D. Offenhartz, R. H. Micheels, and A. D. Darrow Apr. 1982 35 p refs

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(DE83-002860; SERI/TR-8041-13-T1) Avail: NTIS HC A03/MF A01

It has been demonstrated that phosphorescent transition metal complexes can provide a solution to the problem of reabsorption of luminescence in Luminescent Solar Collection (LSC) dyes. The major difficulty encountered in the development of such inorganic dyes was insufficiently high phosphorescence quantum yields. The highest yields measured were too low by a factor of 3 or more. The major effort in the program was directed at obtaining higher quantum yields. One promising metal-porphyrin complex, Pt-(EtiO), which should have a room temperature quantum yield of about 0.7 according to literature reports, was only partially evaluated. DOE

N83-22800# Los Alamos Scientific Lab., N. Mex. Economics Group.

ROLE OF WATER IN ENERGY DEVELOPMENT

David Abbey, Fred Roach, and Lee Brown (New Mexico Univ.) 1982 30 p refs Presented at the Ann. Meeting of the Am. Assoc. for the Adv. of Sci., Washington, D.C., 3-8 Jan. 1982

(Contract W-7405-eng-36)

(DE82-011986; LA-UR-82-674; CONF-820118-6) Avail: NTIS HC A03/MF A01

The physical availability of water and the role of economics in water demand by energy are reviewed. The social mechanisms through which the physical availability of water, the historical pattern of water use, and unresolved water issues combine to constrain and channel the energy industry's use of water are described. These mechanisms include the developing markets for water rights, the legal and administrative structure governing water allocation, the formation of social attitudes about water, and the political process that often implements concensus. DOE

N83-22801# Sandia Labs., Albuquerque, N. Mex.

INDUSTRY/GOVERNMENT FORUM ON RECENT POLICY AND BUDGET CHANGES IN THE DOE SOLAR-THERMAL PROGRAM

L. G. Radosevich, ed. 6 May 1981 39 p refs Forum held at Fredricksburg, Va., 6 May 1981

(Contract DE-AC04-76DP-00789)

(DE82-012511; SAND-82-8207) Avail: NTIS HC A03/MF A01

A transcript is presented of an industry/government forum on solar thermal energy. The forum addressed recent policy and budget changes and their effect on the solar thermal program. DOE

N83-22802# Sandia Labs., Albuquerque, N. Mex.

PERSPECTIVE ON OUR ENERGY OPTIONS

J. H. Scott 1982 10 p refs Presented at Spring Meeting for the Soc. for the Adv. of Mater. and Process Engr., San Diego, Calif., 4 May 1982

(DE82-005828; SAND-82-0240C; CONF-82051-2) Avail: NTIS HC A02/MF A01

The United States is going to have to depend on an increasing mix of energy recovery and conversion processes, and they all have problems. These problems are discussed from the perspective of a national laboratory which has had the opportunity to conduct research and development on many of the options. Energy options discussed are: energy conservatioin; liquid fuels and how to acquire the needed supply (from kerogen, enhanced oil recovery,

coal liquefaction); use of natural gas; geothermal energy sources; wind and solar energy; and nuclear power. DOE

N83-22803# Hanford Engineering Development Lab., Richland, Wash.
ASSESSMENT OF THE NEED FOR DRY COOLING, 1981 UPDATE
J. C. Sonnichsen Jan. 1982 117 p refs
(Contract DE-AC06-76FF-02170)
(DE82-009395; HEDL-TME-81-47) Avail: NTIS HC A06/MF A01

An assessment of the need for dry cooling of steam-electric power plants over the time period 2000 to 2020 is documented. In the assessment three scenarios for future growth in electrical energy were examined. Characteristics of fresh water supply and consumptive use of water in each of the 99 aggregated subareas within the contiguous United States were reviewed; based on this review the need for dry cooling in each pertinent subarea was delineated. DOE

N83-22804# Pacific Northwest Lab., Richland, Wash.
ISSUES AFFECTING STORAGE OF COMPRESSED AIR IN SOLUTION-MINED SALT CAVITIES
R. D. Allen, T. J. Doherty, and R. L. Thoms (Louisiana State Univ.) Apr. 1982 10 p refs Presented at the 17th Intersoc. Energy Conversion Eng. Conf., Los Angeles, 8 Aug. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002017; PNL-SA-10076; CONF-820814-35) Avail: NTIS HC A02/MF A01

Geologic exploration and solution mining at Huntorf, Federal Republic of Germany, are discussed. Geologic factors affecting salt deposit acceptability for CAES include diameter, depth, thickness, mineralogy, strength, faulting, seismic susceptibility, caprock quality and dissolution rate by ground water. Assessment of a site involves analysis of existing information, seismic surveying, exploratory drilling, salt and caprock examination, geophysical logging, in situ stress measurement, and determination of hydrologic impact. Cavern design parameters include octahedral shear strength, excess lateral stress, depth to cavern top, lateral salt thickness, vertical salt thickness, span, and height to diameter ratio. Noncompensated cavern operation involves cycling with respect to temperature, pressure, humidity and water. Cavern, borehole and surface monitoring methods are discussed. DOE

N83-22805# Pacific Northwest Lab., Richland, Wash.
AQUIFER COMPRESSED-AIR FIELD EXPERIMENT AT PITTSFIELD, ILLINOIS
Robert D. Allen and Terrence J. Doherty Jun. 1982 9 p refs Presented at the AIAA/EPRI Intern. Conf. on UPH and Compressed Air Energy Storage, San Francisco, 21 Sep. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002057; PNL-SA-10166; CONF-820969-2) Avail: NTIS HC A02/MF A01

Compressed air energy storage (CAES) is an electrical generation load-leveling technique. Air is stored within geologic reservoirs for use during peak demand. Aquifers can store natural gas economically and may be suitable for CAES, but differences in geochemistry, cycling period, temperature and viscosity must be evaluated. Geologic exploration identified a test site near Pittsfield, Illinois. The reservoir is a gently inclined dome consisting of impervious dolomitic caprock overlying permeable sandstone. The closure is 200 m deep, about 200 m in radius, and 10 m thick. Water discovery pressure is near 1100 kPa. Air will be injected at near ambient temperature and relative humidity of about 5%. Cyclic injections will take place at 500, 1000, 1500 and 2000 C, each set lasting three months. Temperature, pressure, liquid water content, relative humidity and withdrawn mineral particles will be monitored and analyzed to enable comparisons of reservoir behavior with numerical and experimental models. Pre- and post-test cores will be compared with respect to chemical composition, mineralogy, microstructure, and physical properties. Data from the field and laboratory along with numerical modeling studies, will be integrated to develop comprehensive stability criteria for compressed air energy storage within aquifer type reservoirs. DOE

N83-22806# Pacific Northwest Lab., Richland, Wash.
UNDERGROUND ENERGY-STORAGE PROGRAM OVERVIEW
Landis D. Kannberg Jul. 1982 9 p Presented at the Energy Storage Contractors Rev. Meeting, Arlington, Va., 23 Aug. 1982
(Contract DE-AC06-76RL-01830)
(DE83-002059; PNL-SA-10591; CONF-820827-28) Avail: NTIS HC A02/MF A01

Characterization of the performance of thermal energy systems at injection temperatures of less than 850 C is nearly complete. Studies of injection and storage at temperatures up to 1500 C were initiated and continue through FY-1983. Studies of nonaquifer seasonal thermal energy systems including cavern and ice storage systems also continue. Stability criteria and guidelines documents were published for salt and hard rock compressed air energy storage (CAES) reservoirs. A preliminary screening of materials for use in thermal storage units of adiabatic and hybrid CAES systems was completed. Two materials, denstone and Dresser basalt, survived screening tests and are recommended for additional long term testing. DOE

N83-22807# Texas A&M Univ., College Station. Center for Energy and Mineral Resources.
ETHANOL PRODUCTION IN SMALL- TO MEDIUM-SIZE FACILITIES Final Report
Edward A. Hiler, Charlie G. Coble, Henry P. ONeal, John M. Sweeten, Vincent G. Reidenbach, Gerald T. Schelling, James T. Lawhon, Ronald D. Kay, Wayne A. LePori, William H. Aldred et al Apr. 1982 152 p refs
(TENRAC Proj. 80-B-1-1)
(DE83-900875; TENRAC/EDF-066) Avail: NTIS HC A08/MF A01

In early 1980 system design criteria were developed for a small-scale ethanol production plant. The plant was eventually installed on November 1, 1980. It has a production capacity of 30 liters per hour; this can be increased easily (if desired) to 60 liters per hour with additional fermentation tanks. Sixty-six test runs were conducted to date in the alcohol production facility. Feedstocks evaluated in these tests include: corn (28 runs); grain sorghum (33 runs); grain sorghum grits (1 run); half corn/half sorghum (1 run); and sugarcane juice (3 runs). In addition, a small bench-scale fermentation and distillation system was used to evaluate sugarcane and sweet sorghum feedstocks prior to their evaluation in the larger unit. In each of these tests, evaluation of the following items was conducted: preprocessing requirements; operational problems; conversion efficiency (for example, liters of alcohol produced per kilogram of feedstock); energy balance and efficiency; nutritional recovery from stillage; solids separation by screw press; chemical characterization of stillage including liquid and solids fractions; wastewater requirements; and air pollution potential. DOE

N83-22808# North Carolina State Univ., Raleigh. Dept. of Mechanical and Aerospace Engineering.
FIRST YEAR'S PERFORMANCE DATA OF THE NCSU SOLAR ENERGY AND CONSERVATION HOUSE
Nov. 1982 23 p
(Contracts DE-AC02-82CH-10116; DOE-1250-C-410-0082)
(DE83-004800; DOE/CH-10116/1) Avail: NTIS HC A02/MF A01

A solar energy and conservation house is described. It has 2000 square feet of floor area and contains a two-story embedded sunspace, two Trombe walls, active solar hot water heating for domestic use, thermal storage in a rock filled ceiling/floor, and numerous research treatments, and energy conservation features. The house is completely decorated and furnished in an attractive manner and the exterior architecture is traditional and has broad consumer appeal. The house is open to the public on weekdays and numerous people and various groups come to visit on their own initiative and others take advantage of the close proximity to McKimmon while attending conferences there. The overall thermal

performance of the house greatly exceeds initial predictions and expectations. For instance, only 660 kWh of electricity (cost of $39.60 in 1981 to 1982) were used by the heat pump to heat the house for the entire winter of 1981 to 1982. That winter season experienced 3554 heating degree days and consequently such a low heating consumption represents truly remarkable thermal performance and design. Similarly, the house performed well during a typically hot and humid summer in central North Carolina. The heat pump consumed 1157 kWh of electricity ($69.42) for the entire summer of 1982. DOE

N83-22809# Trinity Univ., San Antonio, Tex.
SOLAR-REGENERATED DESICCANT DEHUMIDIFICATION Final Report
Philip Haves 9 Feb. 1982 146 p refs
(TENRAC Proj. 80-S-1-3)
(DE83-900823; RENRAC/EDF-064) Avail: NTIS HC A07/MF A01

The dehumidification requirements of buildings are discussed, and the most suitable desiccant material is identified as silica gel. Several conceptual designs for solar regenerated desiccant dehumidifiers using a solid desiccant are described. The construction and operation of a laboratory experiment to determine the performance of a packed bed of silica gel at low flow rate is described. The experimental results are presented and compared to the predictions of a simple computer model which assumes local equilibrium between the desiccant and the airstream. The simulations used to predict desiccant bed performance and the integration of the desiccant bed simulation with a simulation of the thermal performance of a passively cooled residence are described. Results for an average July day are presented. Sizing relationships derived from the simulation are described, and an economic analysis and recommendations for further work are presented. DOE

N83-22810# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research Dept.
FUEL-CELL TECHNOLOGY ASSESSMENT. VOLUME 4. EVALUATION OF TAIWAN
V. Robert Latorre and Leo R. Spogen, Jr. 15 Aug. 1982 27 p 5 Vol.
(Contract W-7405-eng-48)
(DE83-004160; UCID-19412-Vol-4) Avail: NTIS HC A03/MF A01

The potential for US fuel-cell technology in selected countries was evaluated. The results of the evaluations and the pertinent factors which influence their outcome are given. Data for Taiwan is given. DOE

N83-22811# Pacific Gas and Electric Co., San Francisco, Calif.
DEVELOPMENT OF THE UTILIZATION OF COMBUSTIBLE GAS PRODUCED IN EXISTING SANITARY LANDFILLS: INVESTIGATION OF EFFECTS OF AIR INCLUSION
Jan. 1983 56 p refs Prepared in cooperation with Dynatech R/D Co., Cambridge, Mass.
(Contract DE-FG01-79CS-20291)
(DE83-005123; DOE/CS-20291/4) Avail: NTIS HC A04/MF A01

The effects of nitrogen and oxygen on landfill gas operations are discussed. A combustible gas mixture composed of methane and carbon dioxide is generated in municipal solid waste landfills. A consequence of the collection of this fuel gas is the inclusion of some air in the collected product. The effects include increased collected and purification costs, reduction in the quality of the fuel gas produced, corrosion, explosion hazards, and interference with odorant systems. The scope of such effects was determined by using landfill data of a gas recovery site as a basis. Useful supplemental fuel gas may be recovered despite the inclusion of air. Recommendations are made for establishing limits for nitrogen and oxygen content and minimizing the costs associated with their presence. DOE

N83-22812# Opportunity Systems, Inc., Washington, D.C.
STATE OF CALIFORNIA: RESOURCE-RECOVERY PROFILE
DOE Jan. 1983 206 p refs
(Contract DE-AC01-81CS-24454)
(DE83-004949; DOE/CS-24456/2) Avail: NTIS HC A10/MF A01

The municipal refuse-to-energy conversion projects in the State of California are identified and outlined. Technologies include: combustion systems, refuse-derived fuel systems, co-combustion, methane from landfill systems, and methane from wastewater systems. Also included is a brief legislative history and discussion of progress and problems relating to the waste-to-energy projects. DOE

N83-22813# Institute of Gas Technology, Chicago, Ill.
HYDROGEN USE IN A RURAL ALASKAN COMMUNITY
Timothy D. Donakowski, Christopher F. Blazek, Martin Novil, and Edward J. Daniels 13 Jun. 1982 10 p refs Presented at the World Hydrogen Energy Conf., Pasadena, Calif., 13-17 Jun. 1982 Sponsored in part by DOE and Alaskan Dept. of Commerce and Economic Development
(DE83-000568; CONF-820605-21) Avail: NTIS HC A02/MF A01

The plan and design of a program which demonstrates an all hydrogen community in rural Alaska are discussed. The prospects of reducing Alaska's dependency on fossil fuels by producing hydrogen from renewable resources and easing the burden of transporting fuel to remote sites are assessed. The hydrogen system considers Alaska's unique resources, supply logistics, demographics, and economics. Integration of hydrogen production with transportation, distribution, storage, and utilization equipment is discussed for a rural village. One aspect of the community's energy use and supply will be converted to an all hydrogen. This includes equipment required for hydrogen production, residential hydrogen utilization, transportation, and electricity generation. The social, legal, and economic issues encountered in planning the demonstration are described. Author

N83-22814# Midwest Research Inst., Golden, Colo. Solar Energy Conversion Research Div.
PHOTOVOLTAIC ADVANCED RESEARCH AND DEVELOPMENT PROGRAM IN THE UNITED STATES
J. L. Stone, D. W. Ritchie, T. Surek, and C. E. Witt Sep. 1982 12 p refs Presented at the 4th Photovoltaic Solar Energy Conf., Stresa, Italy, 10-14 May 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-000307; SERI/TP-211-1609; CONF-820555-5) Avail: NTIS HC A02/MF A01

The major thrust of the Advanced Research and Development Subprogram is to achieve technical feasibility for various advanced material technologies through long term, high risk, and potentially high payoff research and development. Two approaches are being pursued in order to achieve the cost and efficiency goals. One is to research various polycrystalline and amorphous thin film semiconducting materials on low cost substrates. The other approach is to use solar concentrators in the form of either high efficiency multibandgap cells having 20-40% efficiency potential or luminescent collectors. Polycrystalline thin films under development include polycrystalline silicon, II-VI compounds such as CdS and CdTe and III-V compounds such as GaAs. Also included are photoelectrochemical cells with polycrystalline photoelectrodes. The technical approaches, funding, and future activities are described for each area of research. DOE

N83-22815# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
INSTRUMENTATION OF THE BROOKHAVEN NATURAL THERMAL STORAGE HOUSE
H. T. Ghaffari and R. G. Jones 1982 10 p refs Presented at the Instrumentation Soc. of Am. Intern. Conf., Philadelphia, 18-21 Oct. 1982
(Contract DE-AC02-76CH-00016)
(DE83-000267; BNL-31828; CONF-821033-1) Avail: NTIS HC A02/MF A01

The Brookhaven Natural Thermal Storage House is a superinsulated energy-conserving house with various conservation and passive solar design features. The house is fully instrumented; 72 data points are scanned every 6 seconds and recorded every

15 minutes. The details on the datalogging system capable of receiving 48 analog, 16 digital, and 8 discrete inputs are discussed. The interfacing consists of an enclosure, terminal, modem, and magnetic tape recorder. Finally, the method of installation and schemes of measuring the ambient, surface, and mass temperatures, dew point, and weather data are explained. DOE

N83-22816# Stanford Univ., Calif. Inst. for Energy Studies.
INTERNATIONAL ENERGY WORKSHOP, 1981
Alan S. Manne, ed. Jun. 1982 47 p Workshop held at Stanford, Calif., 10-11 Dec. 1981 Sponsored in part by EPRI
(Contract DE-AT03-79PE-70117)
(DE82-021183; CONF-811267-Summ) Avail: NTIS HC A03/MF A01

Individual papers are synopsized with an overall assessment of the workshop. Poll results taken during the workshop are presented with tabulated data on: real price of crude oil; real gross national product total primary energy consumption; domestic oil production, and oil imports for 1990 and 2000. A reference case is projected. DOE

N83-22817# Oak Ridge National Lab., Tenn. Energy Div.
HEAT-ACTIVATED HEAT-PUMP DEVELOPMENT AND POTENTIAL APPLICATION OF STIRLING-ENGINE TECHNOLOGY
P. D. Fairchild and C. D. West 1982 43 p refs Presented at the 20th Automotive Technol. Develop. Contractor Coordination Meeting, Dearborn, Mich., 25-28 Oct. 1982
(Contract W-7405-eng-26)
(DE83-002134; CONF-821055-1) Avail: NTIS HC A03/MF A01

Presented is a brief overview of the heat-activated heat pump technology development program being carried out with emphasis on the Stirling engine technology projects. The major projects are reviewed as they were formulated and carried out under the previous product development guidelines. The revised technology development focus and current status of those major hardware projects are discussed. The key issues involved in applying Stirling engine technology to heat pump equipment are assessed. The approach and planned future activities to address those issues are described. Also included are brief descriptions of two projects in this area supported by the Gas Research Institute. DOE

N83-22818# Texas Univ., Austin. School of Architecture.
PASSIVE-SOLAR HOMES FOR TEXAS
Michael L. Garrison 1982 188 p refs Sponsored in part by the Texas Energy and Natural Resources Advisory Council
(DE83-900806; TENRAC/EDF-082) Avail: NTIS HC A09/MF A01

Acceptance of passive solar technologies has been slow within the conventional building trades in Texas because it is a common misconception that solar is expensive, and data on local applications is severely limited or nonexistent. It is the purpose of this solar development to move passive solar design into the mainstream of public acceptance by helping to overcome and eliminate these barriers. Specifically, the goal is to develop a set of regional climatic building standards to help guide the conventional building trade toward the utilization of soft energy systems which will reduce overall consumption at a price and convenience most Texans can afford. To meet this objective, eight sample passive design structures are presented. These designs represent state of the art regional applications of passive solar space conditioning. The methodology used in the passive solar design process included: analysis of regional climatic data; analysis of historical regional building prototypes; determination of regional climatic design priorities and assets; prototypical design models for the discretionary housing market; quantitative thermal analysis of prototypical designs; and construction drawings of building prototypes. DOE

N83-22819# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM APPLICATION EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 1: DALLAS - FORT WORTH REGIONAL AIRPORT, TEXAS, JULY 1982
Nov. 1982 27 p refs
(Contract DE-AC04-76DP-00789)
(DE83-004763; SAND-81-7083/1) Avail: NTIS HC A03/MF A01

The data accumulated during July at the intermediate photovoltaic project at Dallas-Fort Worth Regional Airport, Texas are presented. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided. DOE

N83-22820# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research Dept.
FUEL-CELL TECHNOLOGY ASSESSMENT. VOLUME 1: THE POTENTIAL VALUE OF US FUEL-CELL TECHNOLOGY IN FOREIGN COUNTRIES
V. Robert Latorre and Leo R. Spogen, Jr. 15 Aug. 1982 60 p 5 Vol.
(Contract W-7405-eng-48)
(DE83-004372; UCID-19412-Vol-1) Avail: NTIS HC A04/MF A01

Fuel cell power plants are in an advanced state of development. Many factors influence whether these plants will be used in a specific country and whether US industry will supply them. The potential for US fuel cell technology in selected countries (Japan, Tunisia, Taiwan, and South Korea) was evaluated. The results of the evaluations and the pertinent factors which influenced their outcome are provided. The approach, basic data on fuel cells and their competitors for several applications, evaluation procedures, specific country data needed for the evaluation, and the step by step method used are provided. DOE

N83-22821# Pritchard Corp., Kansas City, Mo.
UNDERGROUND COAL GASIFICATION (UCG) GAS TO METHANOL AND MTG-GASOLINE: AN ECONOMIC AND SENSITIVITY STUDY, TASK B
Jun. 1982 238 p refs
(Contract W-7405-eng-48)
(DE83-004320; UCRL-15510) Avail: NTIS HC A11/MF A01

The technical and economic aspects of the production of methanol and gasoline using gas from an underground coal gasification (UCG) facility are discussed. The economics of producing gasoline is studied as well as a number of other aspects of the economics of upgrading UCG gas. Capital and operating costs for three different capacities of gasoline plants are presented. These are 1600 barrels per day (BPD), 4800 BPD, and 9600 BPD. These capacities are equivalent to fuel grade methanol plants having capacities of 4000 BPD, 12,000 BPD, and 24,000 BPD - the methanol capacities considered in the previous studies. The economics of the gasoline plant were developed using published information and the best estimate of the processing steps in the gasoline process. Several sensitivity studies were undertaken to examine the sensitivity of both methanol and gasoline product costs to changes in technical and economic parameters. DOE

N83-22822# Solarex Corp., Rockville, Md.
SILICON CONCENTRATOR CELL-ASSEMBLY DEVELOPMENT
Aug. 1982 71 p refs
(Contract DE-AC04-76DP-00789)
(DE83-001683; SAND-80-7075) Avail: NTIS HC A04/MF A01

The purpose was to develop an improved cell assembly design for photovoltaic concentrator receivers. Efforts were concentrated on a study of adhesive/separator systems that might be applied between cell and substrate, because this area holds the key to improved heat transfer, electrical isolation and adhesion. It is also the area in which simpler construction methods offer the greatest benefits for economy and reliability in the manufacturing process. Of the ten most promising designs subjected to rigorous environmental testing, eight designs featuring acrylic and silicon adhesives and fiberglass and polyester separators performed very well. DOE

N83-22823# Exxon Research and Engineering Co., Bayton, Tex.
DYNAMIC SIMULATION OF EXXON'S CATALYTIC COAL-GASIFICATION PROCESS
Howard D. Franklin, Richard S. Parnas, Charles Kahn, and Narendra Y. Gaitonde Nov. 1982 17 p refs Presented at the Ann.

Meeting of Heat Transfer and Energy Conversion, Los Angeles, 14 Nov. 1982
(Contract DE-AC01-78ET-13005)
(DE82-021973; CONF-821106-9) Avail: NTIS HC A02/MF A01

A dynamic simulation of the Catalytic Coal Gasification (CCG) process was done to determine whether the process interactions presented any controllability problems as well as to help design a control scheme for the process. While there were previous dynamic simulation of both fixed and fluidized bed coal gasifiers, these simulations were all performed for noncatalytic gasification processes, and thus would not show the process dynamics implications resulting from the unique features of the CCG process. Unique features of closed control loop responses are given. The Exxon Catalytic Coal Gasification process is a novel method for producing methane directly from coal. Its key features from a process dynamics standpoint are use of a catalyst which causes both the highly endothermic gasification and exothermic methanation reactions to occur in the same reactor, separation of product gas in a highly heat-integrated cryogenic section, and recycle of product carbon monoxide and hydrogen back into the reactor. DOE

N83-22824# Department of Energy, Grand Forks, N. Dak. Energy Technology Center.
LIQUEFACTION BEHAVIOR OF A CANADIAN SUBBITUMINOUS COAL IN COMPARISON WITH SEVERAL US LIGNITES AND SUBBITUMINOUS COALS
G. G. Baker, C. L. Knudson, S. A. Farnum, B. W. Farnum, and W. G. Willson Sep. 1982 72 p refs
(DE82-021976; DOE/GFETC/RI-82/5) Avail: NTIS HC A04/MF A01

A conceptual design is presented for a preparation facility processing 1.46 million tons per year (4000 tpd) of lignite in which the sodium content of the total product is reduced from 8.5 to 4 pct (as Na2O in ash). Sodium removal from the lignite is by ion exchange using hydrogen ions from aqueous sulfuric acid. Limited experimental data was obtained using a bench scale continuous countercurrent ion exchange unit for design purposes. This includes the decision of the ion exchanger, the lignite washing and dewatering facilities, and the waste water clean-up steps. Complete material balances and energy requirements are presented. A brief discussion of instrumentation and process control is given. Most equipment can be obtained commercially. To limit the environmental impact, extensive cleaning and reuse of process water is employed. Waste effluent is discharged to an evaporation pond. The total capital investment was estimated to be $21.88 million in mid-1979 dollars with annual operating costs of $6.08 million. The unit processing cost was determined at $4.17 per ton of lignite input. Raw materials represent 9 pct of the unit cost, whereas finance charges are nearly 32 pct. It was concluded that this ion exchange process is technically feasible, and in certain favorable circumstances, may be economically viable. Author

N83-22825# Department of Energy, Morgantown, W. Va. Energy Technology Center.
METHANE HYDRATES WORKSHOP TECHNICAL PROCEEDINGS
R. D. Malone, ed. Aug. 1982 123 p refs Workshop held at Morgantown, W. Va., 29 Mar. 1982
(DE83-000580; DOE/METC-82/49; CONF-820393) Avail: NTIS HC A06/MF A01

Included in the Methane Hydrates Workshop proceedings are three work group presentations, eight papers, four abstracts of papers and two appendices (workshop agenda and participation list). The eight papers are abstracted individually. DOE

N83-22826# California Energy Commission, Sacramento.
GEOTHERMAL ENERGY, OPPORTUNITIES FOR CALIFORNIA BUSINESS. A TWO-DAY CONFERENCE ON DIRECT UTILIZATION OF GEOTHERMAL ENERGY
Feb. 1982 270 p refs Proc. of Conf. held in San Diego, Calif., 28-29 Sep. 1981
(Contract DE-FC03-79ET-27135)
(DE82-012553; P-500-82-009; CONF-8109128) Avail: NTIS HC A12/MF A01

Topics in geothermal energy utilization are discussed. Opportunities for California business, financing of geothermal projects, sources of private investment, and reservoir insurance are among the topics discussed. DOE

N83-22827# Arctic Enterprises, Inc., Annapolis, Md.
FUEL-CELL-PROPELLED SUBMARINE-TANKER-SYSTEM STUDY
K. E. Court, W. H. Kumm, and J. E. OCallaghan Jun. 1982 244 p refs
(Contract DE-AC01-81FE-15086)
(DE82-015149; DOE/FE-15086/1) Avail: NTIS HC A11/MF A01

A systems analysis of a commercial Arctic Ocean submarine tanker system to carry fossil energy to markets is presented. The submarine is to be propelled by a modular phosphoric acid fuel cell system. An electric utility type fuel cell will be fueled with methanol. Oxidant will be provided from a liquid oxygen tank carried onboard. The route will be under the polar icecap from a loading terminal located off Prudhoe Bay, Alaska to a transshipment facility postulated to be in a Norwegian fjord. The system throughput of the gas fed methanol cargo will be 450,000 barrels per day. DOE

N83-22828# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
INVESTIGATION OF ATTIC INSULATION EFFECTIVENESS USING ACTUAL ENERGY CONSUMPTION DATA
T. F. Scanlan, C. K. Bayne, and D. R. Johnson Sep. 1982 69 p refs
(Contract W-7405-eng-26)
(DE83-000225; ORNL-5825) Avail: NTIS HC A04/MF A01

The effectiveness of attic installation was determined using actual energy consumption and weather data for 34 single family residences. For each residence, linear regression was used to determine the actual winter energy consumption rates for 2 years before and 3 years after the installation of attic insulation. Comparison of the pre- and post-installation energy consumption rates confirmed the effectiveness of attic insulation. Sufficient agreement between postinsulation predicted and actual consumption rates indicated that the insulation degradation factors has no gross effect and that estimates of heat loss through the ceiling based on the simple conductive heat loss model are adequate. DOE

N83-22829# Process Plants, Inc., Houston, Tex.
THE ENGINEERING AND ECONOMICS OF AN ETHANOL/GASOHOL JOINT-VENTURE PROJECT WITH CALDWELL SUGARS CO-OP, INC. AT THIBODAUX, LOUISIANA. ATTACHMENT A. VOLUME 2: DEFINITION OF FACILITIES AND SCOPE OF WORK FOR AN ETHANOL FACILITY TO BE LOCATED AT THIBODAUX, LOUISIANA
Apr. 1982 582 p Prepared in cooperation with Tate and Lyle Technical Services Ltd. 5 Vol.
(Contract DE-FG07-81RA-50338)
(DE83-001165; DOE/RA-50338/1-Vol-2-Attach-A) Avail: NTIS HC A25/MF A01

Equipment specifications and the equipment specification index are presented for a plant capable of handling 10,000 bushels of grain per hour. DOE

N83-22830# Boeing Computer Services, Inc., Seattle, Wash.
INTERMEDIATE PHOTOVOLTAIC SYSTEM EXPERIMENT OPERATIONAL PERFORMANCE REPORT. VOLUME 3: FOR G. N. WILCOX MEMORIAL HOSPITAL, KAUAI, HAWAII
Sep. 1982 30 p refs
(Contract DE-AC04-76DP-00789)
(DE83-000801; SAND-81-7080/3-Vol-3) Avail: NTIS HC A03/MF A01

A photovoltaic power system was used to provide electricity and a heating source for a hospital. Practical experience was gained in using photovoltaic systems for the generation of electricity and heat. Problems associated with the utility power tie-in during

any period of excessive or insufficient power generation were assessed. The photovoltaic concentrator system was also assessed. S.L.

N83-22831# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ADVANCED SILICON-SHEET-GROWTH TECHNIQUES
Thomas Surek Jun. 1982 24 p refs Presented at the Am. Section of the Intern. Solar Energy Soc. Conf., Houston, Tex., 1 Jun. 1982
(Contract DE-AC02-77CH-00178)
(DE82-017088; SERI/TP-211-1637; CONF-820629-12) Avail: NTIS HC A02/MF A01

The status of silicon sheet growth techniques for photovoltaic applications is critically reviewed. The advanced processes reviewed include web-dendrite growth, edge-defined film-fed growth, edge-supported pulling, edge stabilized ribbon, silicon-on-ceramic, low-angle silicon sheet growth, and the ribbon-to-ribbon process. Comparisons are made of the process stabilities in terms of the thermal and mechanical (i.e., meniscus) control characteristics, and of the resultant controls on the ribbon geometry (i.e., width and thickness). The processes are also compared based on material quality considerations. Recent advances in the technologies and problems which need to be resolved are described. The emphasis of the discussions is on examining the viability of these sheet materials as solar cell substrates for low-cost silicon photovoltaic systems. DOE

N83-22832# New Hampshire Univ., Durham. Dept. of Civil Engineering.
SHEBMS: SMALL HYDROELECTRIC BASIN MODELING SYSTEM
Mar. 1982 130 p refs
(Contract DE-AC01-80RA-50282)
(DE82-015411; DOE/RA-50282/T1) Avail: NTIS HC A07/MF A01

A user manual is presented for the small hydroelectric basis modeling system (SHEBMS) which simulates the performance of a hydroelectric system by collectively simulating the performance of its interconnecting components. These components consist of watersheds, ponds, rivers, dams, penstocks, gates, turbines and generators. DOE

N83-22833# Sandia Labs., Albuquerque, N. Mex.
SECOND-GENERATION HELIOSTAT EVALUATION Executive Summary
Jan. 1982 18 p
(DE82-010261; SAND-81-8033) Avail: NTIS HC A02/MF A01

Five heliostat designs were evaluated. Four of the heliostats are viable designs with unique approaches to the same generic design. The designs have varying amounts of risk. Additional development is required and minor design changes can benefit all of the designs. Detailed cost estimates indicate that the heliostat cost goal can be met at low production rates. DOE

N83-22834# Sandia Labs., Albuquerque, N. Mex.
STUDY OF BATTERY ACCELERATED-TESTING TECHNIQUES Final Report
J. E. Clifford and R. E. Thomas Apr. 1982 85 p refs
(Contract DE-AC04-76DP-00789)
(DE82-017125; SAND-82-7049) Avail: NTIS HC A05/MF A01

A literature review and manufacturers survey was conducted to identify the status of accelerated testing and published information pertinent to battery life. The principles of accelerated testing are reviewed with reference to lead-acid batteries. Preliminary experimental designs for accelerated testing of batteries for solar applications are discussed with reference to current laboratory tests at Sandia covering minimal factorial design; the team approach to generally accepted accelerated test designs; and a suggested new approach to accelerated testing with minimal failures. DOE

N83-22835# Main (Charles T.), Inc., Boston, Mass.
REPORT ON TECHNICAL FEASIBILITY OF UNDERGROUND PUMPED HYDROELECTRIC STORAGE
T. J. Doherty Mar. 1982 126 p refs
(Contract DE-AC06-76RL-01830)
(DE82-014347; PNL-4248) Avail: NTIS HC A07/MF A01

The technical and economic aspects of constructing a very high head underground hydroelectric pumped storage were examined at a prefeasibility level. Excavation of existing caverns in the West Rutland Vermont marble quarry would be used to construct the underground space. A plant capacity of 1200 MW and 12 h of continuous capacity were chosen as plant operating conditions. The site geology, plant design, and electrical and mechanical equipment required were considered. It was concluded that the cost of the 1200 MW underground pumped storage hydro electric project at this site, even with the proposed savings from marketable material, amount to between $581 and $595 per kilowatt of installed capacity on a January 1982 pricing level. It was concluded that the West Rutland underground pumped storage facility is uneconomic at this time. DOE

N83-22836# Massachusetts Univ., Amherst.
GEOTECHNICAL BASIS FOR UNDERGROUND ENERGY STORAGE IN HARD ROCK Final Report
O. C. Farquhar Mar. 1982 409 p refs Sponsored by EPRI
(EPRI Proj. 1199-11)
(DE82-903307; EPRI-EM-2260) Avail: NTIS HC A18/MF A01

Underground pumped hydroelectric storage requires the excavation of caverns in hard rock. Hard rock caverns, also, are one option for compressed air stoage. Preliminary design studies for both technologies at a specific site were completed. The geotechnical aspects of these storage systems are discussed from a generic viewpoint. Information about effective use of hard rock openings, including tunnels and shafts, comes mainly from other types of underground projects. These are power houses for hydroelectric and conventional pumped storage schemes, as well as transportation facilities and mines. Rock strength, support, instrumentation, costs, management, and experimental work are among the items considered. Mapping of geologic structures, rock fragmentation, and rock mass properties is also discussed. The general conclusions are that rock types favorable for underground energy storage are present at suitable depths in many areas and that they can be identified by adequate geotechnical exploration prior to detailed design. DOE

N83-22837# MCC Associates, Inc., Silver Spring, Md.
PROCEEDINGS OF THE MECHANICAL, MAGNETIC AND UNDERGROUND ENERGY-STORAGE 1981 ANNUAL CONTRACTORS' REVIEW
Feb. 1982 393 p refs Meeting held in Washington, D.C., 24-26 Aug. 1981
(Contract W-7405-eng-36)
(DE82-008853; CONF-810833) Avail: NTIS HC A17/MF A01

Various topics relating to energy storage are discussed. Compressed air storage, magnetic energy storage, thermal energy storage, and mechanical energy storage are discussed. DOE

N83-22838# Commerce Dept., Washington, D.C. Office of Competitive Assessment.
US ENERGY FOR THE REST OF THE CENTURY Annual Report, 1976-1982
Joseph F. Gustaferro 2 Jul. 1982 37 p
(PB83-114603) Avail: NTIS HC A03/MF A01 CSCL 10A

The basic quantitative results of recent U.S. Commerce Department forecasting efforts in the energy area are summarized. The data cover the entire spectrum of U.S. energy requirements and focus on the end-use of energy for operational purposes, e.g., highway transportation, space heating, lighting, and road construction. The tables provide data on fuel consumption by types and Btu content for 1981 and as projected for the year 2000. Included also is a table indicating 47 components of industry's use of process heat and process steam. GRA

N83-22839# Science Applications, Inc., La Jolla, Calif.
COORDINATION OF THE ONSITE FUEL CELL PROGRAM Annual Report, Jan. 1981 - May 1982
W. C. Racine and V. D. Ferraro Sep. 1982 88 p Sponsored in part by Gas Research Inst.
(PB83-119545; SAI-444-82-170-LJ; GRI-81/00095) Avail: NTIS HC A05/MF A01 CSCL 10B

The work performed on coordination of the onsite fuel cell program was reported. The overall work was divided into seven areas or tasks: site selection activities, data management activities hardware, data management activities software, program scheduling activities, utility coordination and support, business assessment activities and management and reporting. The primary objectives of the 40 kW Onsite Fuel Cell Field Test project are reached.
GRA

N83-22840# National Bureau of Standards, Washington, D.C. Center for Building Technology.
OUTDOOR EXPOSURE TESTS OF SOLAR ABSORPTIVE COATINGS
Larry W. Masters, James F. Seiler, and Willard E. Roberts Oct. 1982 24 p refs Sponsored in part by DOE
(PB83-124560; NBSIR-82-2583) Avail: NTIS HC A02/MF A01 CSCL 10A

The research presented in this report focuses upon the results obtained by continuing the outdoor exposures of absorptive coatings using ASTM E781-81, Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors with Cover Plates. Comparison of the results of the outdoor exposures with those obtained in accelerated laboratory exposures indicated that (1) the accelerated exposures, as described in ASTM E744-80, Standard Practice for Evaluating Solar Absorptive Materials for Thermal Applications, provide more severe exposure conditions than outdoor exposures, and (2) the degradation processes induced by outdoor exposure are adequately addressed by the accelerated laboratory exposures.
Author (GRA)

N83-22841# National Bureau of Standards, Washington, D.C. Center for Building Technology.
HAIL IMPACT TESTING PROCEDURE FOR SOLAR COLLECTOR COVERS
David R. Jenkins (Univ. of Central Florida) and Robert G. Mathey Apr. 1982 87 p refs Sponsored in part by DOE
(PB83-104745; NBSIR-82-2487) Avail: NTIS HC A05/MF A01 CSCL 10B

Laboratory test results which simulate hail impact on solar collector covers are presented. Development of a test method for evaluating the resistance of solar collector covers to this type of loading is discussed. A procedure for such testing is described as well as results obtained with ice balls impacting four typical collector cover materials. Aspects which are discussed include the preparation of ice balls, the design and operation of a launcher for ice ball propulsion, the method of mounting cover panel specimens, the selection of ice ball velocity and impact location, and techniques for failure or damage assessment.
GRA

N83-22842# Atlas Corp., Santa Cruz, Calif.
DEVELOPMENT OF AN ADVANCED SOLAR AUGMENTED WATER HEATER (FOR SINGLE FAMILY HOME APPLICATIONS) Final Report, Feb. 1980 - May 1982
Howard Grunes, Dennis Morrison, and Francis deWinter Jun. 1982 137 p refs Sponsored by Gas Research Inst.
(PB83-119610; GRI-79/0117) Avail: NTIS HC A07/MF A01 CSCL 13A

A program was undertaken to design, construct and test two advanced prototype solar augmented gas water heaters. Computer analyses and experimental work were used to optimize components and characterize performance. The resulting design includes a solar preheat tank, a gas-fired backup tank, the collector loop pump and all operating controls contained in a single cylindrical package. The backup tank is positioned above the solar preheat tank. The connection between the solar and backup tanks is effectively a thermal diode which restricts heat transfer from the backup to the solar tank but allows the backup tank to become an integral part of solar storage whenever the solar tank temperature surpasses the backup tank set point temperature. Solar heat is supplied through a jacketed tank drainback system.
GRA

N83-22843# National Bureau of Standards, Washington, D.C. National Engineering Lab.
PERFORMANCE CRITERIA FOR SOLAR HEATING AND COOLING SYSTEMS IN RESIDENTIAL BUILDINGS Final Report
Sep. 1982 240 p refs Sponsored in part by HUD
(Contract IAA-H54-81)
(PB83-122663; NBS-BSS-147; LC-82-600581) Avail: NTIS HC A11/MF A01 CSCL 13B

This performance criteria, developed for the Department of Housing and Urban Development, is a baseline document for criteria and standards for the design, development, technical evaluation, and procurement of solar heating and cooling systems for residential buildings in accordance with the requirements of Section 8 of Public Law 93-409, the Solar Heating and Cooling Demonstration Act of 1974. The document is intended to establish minimum levels of performance with regard to health and safety and the various aspects of technical performance. The criteria for health and safety put primary emphasis on compliance with existing codes and standards. The criteria on thermal and mechanical performance, durability/reliability and operation/servicing present performance requirements considered to be representative of acceptable levels.
GRA

N83-22844# Northeastern Forest Experiment Station, Broomall, Pa.
CONVERTING SMALL INDUSTRIAL BOILERS TO BURN WOOD FUELS Final Report
Raymond L. Sarles and J. Penn Rutherfoord 1982 14 p
(PB83-128116; NSRP-NE-508; NEFES/83-11) Avail: NTIS HC A02/MF A01 CSCL 13B

The engineering and economic feasibility of retrofitting two small industrial boilers (32 hp and 52 hp, respectively) for firing green wood fuels is discussed. Subjects covered include fuel requirements and costs; availability, storage, and handling of wood fuels; and designs, specifications, stack emissions, cost estimates, and economic feasibility. The economics of boiler conversion projects are heavily dependent on annual savings in fuel costs. Analyses of variables affecting annual fuel savings determined that the boiler utilization rate and the price of fuel oil had the greatest impact on the economic feasibility of this project.
Author (GRA)

N83-22845# Institute of Gas Technology, Chicago, Ill.
MULTI-FUEL LOW-NOx BURNER DEVELOPMENT, PHASE 2 Final Report, Mar. 1979 - Feb. 1982
Hamid A. Abbasi, Mark J. Khinkis, and Richard T. Waibel May 1982 236 p refs
(PB83-126292; GRI-82/0010) Avail: NTIS HC A11/MF A01 CSCL 13B

The development of high efficiency, low nitrogen-oxides producing multi-fuel industrial burners with flame and heat transfer characteristics suitable for specific industrial processes was investigated. Burners for three industrial processes were designed to achieve a reduction in NOx emissions compared with currently used standard burners: (1) a high excess air burner used in direct air dryers for applications in the food processing industry; (2) a hot air burner with high convective heat transfer for direct fired metal processing furnaces; and (3) a hot air burner with a long, luminous flame for direct fired process furnaces in the steel, aluminum, and glass industries. The high convective, hot air burner achieved NOx emission reduction of up to 50%. NOx emissions from the hot air burner with a long, luminous flame were 45 to 60% lower than the standard burner.
GRA

N83-22179# Civil Aviation Authority, London (England).
FUEL CONSERVATION AND ECONOMY CONSTRAINTS
D. Barber and J. C. Morrall *In* AGARD Air Traffic Control in Face of Users' Demand and Econ. Constraints Feb. 1983 8 p

(For primary document see N83-22177 12-04)
Avail: NTIS HC A06/MF A01

N83-22676# New Mexico Energy and Minerals Dept., Santa Fe.
ELECTRICAL GENERATION
In its Energy Resources in New Mexico 1982 p 47-59 (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-22678# New Mexico Energy and Minerals Dept., Santa Fe.
GEOTHERMAL
In its Energy Resources in New Mexico 1982 p 77-96 refs (For primary document see N83-22672 12-42)
Avail: NTIS HC A05/MF A01

N83-23011# Electricity Supply Commission, Johannesburg (South Africa). Data Processing Systems Dept.
PUMP-TURBINE BOUNDARY CONDITIONS MODELLING FOR PUMPED STORAGE SCHEME CONTROL POLICY SIMULATION
A. M. W. Brauer *In* NRIMS Symp. on Control Theory and Appl. 1982 5 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N83-22846# Committee on Energy and Natural Resources (U.S. Senate).
ACID PRECIPITATION AND THE USE OF FOSSIL FUELS
Washington GPO 1982 1546 p refs Hearing before the Comm. on Energy and Natural Resources, 97th Congr., 2d Sess., 10 Aug. 1982
(GPO-98-172) Avail: Committee on Energy and Natural Resources

Acid precipitation and fossil fuel use in our national energy economy are reviewed. Author

N83-22847# Maine Univ., Orono. Dept. of Botany and Plant Pathology.
EFFECTS OF ACID PRECIPITATION ON FOREST SOILS AND WATERSHED BIOGEOCHEMISTRY IN NEW ENGLAND Progress Report
Christopher S. Cronan Dec. 1982 18 p refs
(Contract DE-AC02-81EV-10750)
(DE83-004156; DOE/EV-10750/1) Avail: NTIS HC A02/MF A01

An experimental framework within an intact forest ecosystem is established that permits the examination of plant-soil functional responses to acid precipitation. Specific objectives include: (1) the determination of whether element leaching from forest soils under current conditions of acid deposition is markedly different from the historical leaching pattern; (2) a comparison of the intrinsic annual rate of acid generation in forest soils with the annual deposition flux of strong acids from the atmosphere; and (3) the determination of whether current conditions of acid deposition have altered any of the important properties or processes of the whole plant-1 soil system. Progress to date includes construction and debugging of the field plot experiment. DOE

N83-22848# Westinghouse Electric Corp., Concordville, Pa. Combustion Turbine Systems Div.
STATIONARY GAS-TURBINE CATALYTIC-COMBUSTOR DEVELOPMENT PROGRAM: PRELIMINARY DESIGN REPORT Final Report
P. W. Pillsbury, K. L. Rieke, J. L. Toof, and E. J. Wisniewski Oct. 1982 194 p refs Sponsored by EPRI
(EPRI Proj. 1657-1)
(DE83-900633; EPRI-AP-2584) Avail: NTIS HC A09/MF A01

The objective of this design study was to evaluate the feasibility of employing catalytic combustion technology to reduce NO sub x emission from utility combustion turbines during base and peak load operations. Eight conceptual catalytic combustor designs were identified and evaluated for their potential to meet specific emissions, performance and reliability goals. Based on those evaluations, a single fixed geometry design was identified as the most promising concept. Additional studies were conducted to produce a detailed preliminary design of this concept. Results of these studies indicated that base load NO sub x emissions could be reduced to the program goal of 20 ppMv with fuels containing less than 300 ppMw fuel bound nitrogen through the application of catalytic combustion technology. However, the application of this technology to utility combustion turbines requires significant advanced technology generation in order to meet the performance and durability requirements of a utility system. In addition, increased system maintenance and reduced reliability could result. DOE

N83-22849# Espey-Houston and Associates, Inc., Austin, Tex.
ACID DEPOSITION IN TEXAS. TECHNICAL SUMMARY AND PERSPECTIVE, VOLUME 2 Final Report
Julian A. Levy, Jr. 15 Jan. 1982 172 p refs 2 Vol.
(DE83-900817; TENRAC/EDF-057-Vol-2) Avail: NTIS HC A08/MF A01

Information drawn from an extensive review of the existing literature concerning the various aspects of acid deposition is given. Additionally, key researchers involved in the study of acid deposition were interviewed to obtain the most current data available and to resolve, if possible, questions generated by the literature review. These data were placed into perspective, with respect to Texas, by a multidisciplinar team of experts having extensive experience in the state. The available body of knowledge suggests that acid deposition is not a problem of immediate concern throughout most of Texas. The potential for a problem in the future may exist, however, in parts of east Texas where acid precipitation was monitored and where the most sensitivity to potential acid deposition effects are found. DOE

N83-22850# Espey-Houston and Associates, Inc., Austin, Tex.
PLAN TO EVALUATE ACID-DEPOSITION ISSUES IN THE STATE OF TEXAS, VOLUME 1 Final Report
Julian A. Levy, Jr. 15 Jan. 1982 90 p 2 Vol.
(DE83-900818; TENRAC/EDF-057-Vol-1) Avail: NTIS HC A05/MF A01

A coherent organized plan to investigate acid deposition in Texas is proposed. A preliminary evaluation of the acid deposition problem nationwide and its relevance to the State of Texas was completed. There is a variety of natural and anthropogenic sources of airborne material important to the process of acid deposition in Texas. These sources are different in character than those found in other areas of the country. Two of the primary acid deposition precursors are emissions of nitrogen oxides (NO/sub x/) and sulfur dioxide (SO2). No single source category is found to be a predominant SO2 or NO/sub x/ producer. Impacts on Texas from anthropogenic sources in adjacent states and Mexico are possible but are undetermined at this time. Natural sources of airborne material can be important in determining local and regional impacts. These natural sources include sea salts from the coastal areas of the state, biogenic sulfur emissions from soils and vegetation, and alkaline particles raised by wind erosion of west Texas soils. DOE

N83-22851# California Univ., Livermore. Lawrence Livermore Lab.
GROSS MECHANISMS OF SMOKE-AEROSOL PRODUCTION FROM SOLIDS, LIQUIDS, AND GASES
Norman J. Alvares 18 Feb. 1982 12 p refs Presented at the Inst. of Environmental Sci. Conf., Atlanta, 20 Apr. 1982
(Contract W-7405-eng-48)
(DE82-009146; UCRL-87211; CONF-820411-4) Avail: NTIS HC A02/MF A01

Polyvinyl chloride (PVC) and Teflon (polytetrafluoroethylene were analyzed thermogravimetrically. Factors that determine the dynamics of smoke transport are discussed. The rate of acid ion

production as a function of radiant flux is given for three materials, small diameter PVC, large diameter PVC, are neoprene. DOE

N83-22852# Oak Ridge National Lab., Tenn.
POLLUTANT-PARTICLE DYNAMICS IN GEOCHEMICAL CYCLES
C. R. Olsen, N. H. Cutshall, and T. A. Nelsen 1982 67 p refs Presented at NOAA Workshop on Pollutant Transport by Particles in the Marine Environ., Norfolk, VA., 19 Jan. 1982
(Contract W-7405-eng-26)
(DE82-009631; CONF-820145-1) Avail: NTIS HC A04/MF A01

A wide variety of substances, with known or potential pollutant capacity, are transported into the marine environment from the continents via river discharge, ocean dumping, or aeolian processes. Many of these substances are highly reactive and have a strong affinity for association with fine-grained particles. The movement of these reactive pollutants, their removal from the water, and their accumulation in the sediments are thus governed to a great extent by sedimentary processes. A review and overview of the biogeochemical aspects of pollutant-particle associations and dynamics is presented. DOE

N83-22853# Brookhaven National Lab., Upton, N. Y. Energy and Economic Analysis Div.
NATIONAL ASSESSMENT OF THE AIR QUALITY IMPACTS OF RESIDENTIAL FIREWOOD USE
Frederick W. Lipfert 1982 14 p refs Presented at the Speciality Meeting on Residential Wood and Coal Combustion, Louisville, Ky., 1 Mar. 1982
(Contract DE-AC02-76CH-00016)
(DE82-009921; BNL-30993; CONF-820353-1) Avail: NTIS HC A02/MF A01

A methodology to project firewood usage at the county level throughout the nation, verification of this algorithm at the state level, and estimates of national air pollution burdens are discussed. Ambient air quality impacts in six northern US cities, using a new area source dispersion model are analyzed. DOE

N83-22854# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
ACID DEPOSITION: EFFECTS ON TERRESTRIAL ECOSYSTEMS
D. S. Shriner 1982 3 p refs Presented at the Estonian Acad. of Sci. Conf., Leningrad, 9 Oct. 1982
(Contract W-7405-eng-26; EPRI Proj. RP-1908-2)
(DE83-001967; CONF-821058-1) Avail: NTIS HC A02/MF A01

The effects of acid rain on forest ecosystems and agricultural crops are summarized. The degree to which these effects are understood is discussed. DOE

N83-22855# Colorado State Univ., Fort Collins. Dept. of Range Science.
RESEARCH ISSUES IN GRAZING LANDS UNDER CHANGING CLIMATE. VOLUME 2, PART 16: ENVIRONMENTAL AND SOCIETAL CONSEQUENCES OF A POSSIBLE CO2-INDUCED CLIMATE CHANGE
Dennis F. Pendleton and George M. VanDyne Dec. 1982 50 p refs 2 Vol.
(Contract DE-AS01-79EV-10019)
(DE83-004723; DOE/EV-10019/16-Vol-2-Pt-16) Avail: NTIS HC A03/MF A01

A study has been made of issues and researchable questions regarding the influence of potential CO2-induced climatic change on grazing lands. Generalized scenarios of possible changes in climate in grazing land regions of the world were constructed based on published and ongoing investigations. These studies were of two general types: general circulation climate, and analyses of historical data for periods which were warmer than average current conditions, based on the assumption that global warming can be expected. A review of scenarios derived from recent research suggests that surface temperature may increase and precipitation may decrease in some important grazing land regions of the world. Research needs related specifically to climate in grazing lands were discussed. Both biological and socio-economic issues were discussed. DOE

N83-22856# California Univ., Los Angeles. Lab. of Biomedical and Environmental Sciences.
ENVIRONMENTAL EFFECTS OF SOLAR-THERMAL POWER SYSTEMS: ECOLOGICAL OBSERVATIONS DURING EARLY TESTING OF THE BARSTOW 10-MWe PILOT STPS
Frederick B. Turner, ed. Nov. 1982 54 p refs
(Contract DE-AC03-76SF-00012)
(DE83-004454; UCLA-12-1385) Avail: NTIS HC A04/MF A01

Environmental measurements were continued at Solar One during 1982, while final steps in construction and early testing were carried out. Measurements of sand depths downwind (east) of the heliostat field indicated that some of the sand blown off the field (most of it between September 1979 and March 1980) was carried farther east, reducing sand depths somewhat in areas just east of the field. Observations of birds between March and June 1982 revealed that the natural avifauna of the field was altered, although the area is still used for feeding by some icterids (larks, blackbirds) and aerial insectivores (swallows, swifts). Of 15 bird asualties ascribable to the presence and/or operation of Solar One, 12 followed collisions with heliostats, three resulted from incineration in heliostat beams. The central receiver tower does not appear to be a source of mortality. Numbers of rodents (particularly kangaroo rats) trapped in areas downwind of the site declined steadily between 1978 and 1982 in areas both closest to the field and as far east as 600 m from the fence. DOE

N83-22857# California Univ., Los Angeles. Lab. of Biomedical and Environmental Sciences.
WIND-FLOW FIELD MEASUREMENTS IN THE WAKE OF THE BARSTOW SOLAR-THERMAL POWER PLANT
Robert L. Radkey and Thomas G. Zambrano Nov. 1982 31 p refs Prepared in cooperation with AeroVironment Inc., Pasadena, Calif.
(Contract DE-AC03-76SF-00012)
(DE83-004451; UCLA-12-1388) Avail: NTIS HC A03/MF A01

A brief flow field measurement study was conducted to determine the effect of the plant on the local wind flow field and to identify resulting possible environmental implications. Wind speed measurements were taken at a reference free stream location and at a number of locations in the wake downstream of the plant. Measurements were taken to about 400 m (1312 ft) downstream with wind shear profiles taken to a height of 50 m (164 ft) AGL at each point in the wake. With the heliostats up, the data showed a wake deficit (wind speed reduction) of about 15% from reference extending over the downstream extent of the measurements. This wake is believed to be detectable 1000 to 2000 m (3280 to 6560 ft) downstream of the plant. With the heliostats stowed, no wake deficit was observed. With this modest wind speed reduction, any accumulation of wind blown particulates will occur within the heliostat field or just downstream within 60 m (197 ft) in the near wake. DOE

N83-22858# National Oceanic and Atmospheric Administration, Rockville, Md.
OCEAN POLLUTION, MONITORING AND RESEARCH, OCTOBER 1980 THROUGH SEPTEMBER 1981 Report to the Congress
Jul. 1982 60 p refs
(PB83-118026; NOAA-82093010) Avail: NTIS HC A04/MF A01 CSCL 08A

A comprehensive and continuing program of monitoring and research regarding the effects of dumping material into ocean waters, coastal waters, and the Great Lakes is reported. A comprehensive and continuing program of research concerning to the possible long range effects of pollution, overfishing, and man induced changes of ocean ecosystems was initiated. There are intrinsic difficulties in distinguishing long-range effects from the acute effects of ocean dumping, or more generally of marine pollution. In response to these considerations, these areas are

consolidated and coordinated to make the overall program more cost-effective and productive. GRA

N83-22859# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.
OBSERVATIONS OF CURRENTS AND WATER PROPERTIES IN COMMENCEMENT BAY
Glenn A. Cannon and Michael W. Grigsby Aug. 1982 46 p refs (PB83-108795; NOAA-TM-OMPA-22; NOAA-82101105) Avail: NTIS HC A03/MF A01 CSCL 08C

Observations of currents and water properties were made in Commencement Bay, Washington, to provide background information for describing physical transport processes in the Bay and the fate and effect of any dissolved and suspended contaminants. Observations were made during low river runoff commencing in September 1980 and during a higher runoff period commencing in March 1981 using moored subsurface current meter arrays and CTD surveys. Each survey entailed shipboard water property measurements for about 3 days during deployment of the current meter arrays. GRA

N83-22860# Maryland Univ., Baltimore. School of Law.
GOVERNING CHESAPEAKE WATERS: A HISTORY OF WATER QUALITY CONTROLS ON CHESAPEAKE BAY, 1607 - 1972
John Capper, Garrett Power, and Frank R. Shivers, Jr. Oct. 1982 153 p refs
(PB83-114785; EPA-600/3-82-088) Avail: NTIS HC A08/MF A01 CSCL 05D

The quality of Chesapeake Bay waters and the measures which governments have taken to influence that quality is studied. Because most conflicts involve the issue of water quality, this study in some respects is a history of Bay use in general. The organizing principle and point of view, however, is the relation of various uses to water quality, and the way in which government has intervened to have some effect on that quality. It proceeds in three steps. First comes a restatement of the geographical, physical, and biological nature of the Bay system. Then comes the history itself. The study period is divided into eras. Within each era the social, economic, and political scene is set, water quality issues are restated, and the responses of governments reviewed. GRA

N83-22861# Environmental Protection Agency, Research Triangle Park, N.C. Environmental Criteria and Assessment Office.
AIR QUALITY CRITERIA FOR OXIDES OF NITROGEN Final Draft Report
Sep. 1982 815 p refs
(PB83-131011; EPA-600/8-82-026) Avail: NTIS HC A99/MF A01 CSCL 06F

Scientific information relative to determining the health and welfare effects associated with exposure to various concentrations of nitrogen oxides in ambient air are evaluated. The major gaps in the knowledge, relative to criteria, are identified. Though the emphasis is on the presentation of data on health and welfare effects, other scientific data are presented and evaluated in order to provide a better understanding of the pollutants in the environment. To this end, separate chapters concerning the properties and principles of formation, emissions, analytical methods of measurement, observed ambient concentrations, the global cycle, effects on vegetation and microorganisms, mammalian metabolism, effects on experimental animals, and effects on humans are included. GRA

N83-22862# Dames and Moore, Bethesda, Md.
GULF COAST ECOLOGICAL INVENTORY USER'S GUIDE AND INFORMATION BASE Final Report
Angelo D. Beccasio, Nick Fotheringham, Alice E. Redfield, Ronald L. Frew, William M. Levitan, Joel E. Smith, and Jarrett O. Woodrow, Jr. Washington U.S. Fish and Wildlife Service Aug. 1982 203 p refs
(Contract DI-14-16-0009-81-063)
(PB83-135939; FWS-OBS-82/55) Avail: NTIS HC A10/MF A01 CSCL 08A

An inventory of important ecological resources along the Gulf Coast, an area of some 475,000 square kilometers (183,400 square miles) is given. The inventory is intended to provide government and industry decisionmakers with valuable ecological information which will assist in the regional siting of oil and gas processing and manufacturing facilities and their respective transportation systems. The preparation of this ecological inventory involved four major tasks: the collection, review, and analysis of available data on coastal fish and wildlife species and their habitats and special land use areas; the synthesis and compilation of these data into a format which is compatible with the requirements of 1:250,000-scale mapping; the preparation of a series of 22 resource inventory graphics for the Gulf Coast; and the preparation of a report narrative keyed to the inventory graphics. GRA

N83-22863# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
MEASUREMENT OF VOLATILE ORGANIC COMPOUNDS Guideline Series
Jul. 1982 40 p refs
(PB83-119420; EPA-450/3-82-019-Suppl-1) Avail: NTIS HC A03/MF A01 CSCL 07D

This document consists of three test methods that the Environmental Protection Agency believes have a wider range of application as written than the reference methods promulgated by the Agency in the course of developing national performance standards for specific source categories. While these three methods do not contain source specific application instructions, they can, with proper consideration as alternate or screening methods, produce results that in many instances are adequate for determining compliance. The methods are General Measurement of Total Gaseous Organic Compound Emissions Using a Flame Ionization Analyzer, Determination of Selected Volatile Organic Emissions by the Adsorption Collection Technique, and Approximate Determination of Selected Volatile Organic Emission Using Detector Tubes. GRA

N83-22864# Energy and Environmental Analysis, Inc., Arlington, Va.
ECONOMIC IMPACT ANALYSIS OF POLLUTION CONTROL TECHNOLOGIES FOR SEGMENTS OF THE INORGANIC CHEMICALS MANUFACTURING INDUSTRY Final Report
May 1982 447 p refs
(Contract EPA-68-01-4618)
(PB83-106757; EPA-440/2-81-023) Avail: NTIS HC A19/MF A01 CSCL 05C

The U.S. Environmental Protection Agency issued effluent guidelines and limitations for the Inorganic Chemicals Manufacturing Industry in July 1982. This report estimates the economic impact of pollution control costs in terms of price changes, effects on profitability, potential plant closures, unemployment, and other secondary effects. A model plant approach is used to assess these impacts for ten chemical subcategories. In nine of the ten subcategories, impacts are minimal. For plants in the chrome pigments subcategory, price and profitability impacts are significant and production line closures are possible. GRA

N83-22865# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
INDUSTRIAL SURFACE COATING: LARGE APPLIANCES. BACKGROUND INFORMATION FOR PROMULGATED STANDARDS Final Report
Oct. 1982 53 p refs
(PB83-124941; EPA-450/3-80-037B) Avail: NTIS HC A04/MF A01 CSCL 13B

Standards of performance are being promulgated under Section 111 of the Clean Air Act to control volatile organic compound emissions from new, modified, and reconstructed large appliance surface coating operations. A detailed summary of the public comments on the proposed standards (45 FR 85085), responses to these comments and a summary of the changes to the proposed standards are presented. GRA

N83-22866# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR NITROGEN OXIDES: ASSESSMENT OF SCIENTIFIC AND TECHNICAL INFORMATION Final Staff Paper
Aug. 1982 121 p refs
(PB83-132829; EPA-450/5-82-002) Avail: NTIS HC A06/MF A01 CSCL 13B

The available scientific and technical information relevant to the review of primary (health) and secondary (welfare) National Ambient Air Quality Standards for Nitrogen Oxides (NO2) were evaluated. Recommendations on alternative approaches to revising the standards are presented. The assessment is intended to bridge the gap between the scientific review in the EPA criteria document for nitrogen oxides and the judgements requirements required of the Administrator in setting ambient air quality standards for nitrogen oxides. GRA

N83-22867# EG and G Automotive Research, Inc., San Antonio, Tex.
A STUDY OF EMISSIONS FROM LIGHT DUTY VEHICLES IN SAN ANTONIO, TEXAS, YEAR 2 Final Report, 29 Jul. 1981 - 29 Jul. 1982
Maurice Forshee and Mark Dalen 30 Jul. 1982 118 p
(Contract EPA-68-03-3024)
(PB83-124743; EPA-460/3-82-009) Avail: NTIS HC A06/MF A01 CSCL 13F

Three hundred 1978 through 1982 in-use light duty vehicles were obtained from the public, in the San Antonio metropolitan area. These vehicles were tested as received for exhaust emissions utilizing the Federal test procedure, the highway fuel economy test, and four short mode tests. All vehicles were subjected to a thorough emissions control component inspection. Fifty vehicles which failed to meet applicable standards received maintenance and a retest. Author (GRA)

N83-22977# Joint Publications Research Service, Arlington, Va.
PRESSING PROBLEMS OF RADIOECOLOGY IN LIGHT OF SOLVING ATOMIC ENERGY PROBLEMS
R. M. Aleksakhin and G. G. Polikarpov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., no. 28 (JPRS-82696) 21 Jan. 1983 p 55-68 refs Transl. into ENGLISH from Radiobiologiya (Moscow), v. 21, no. 1, Jan. - Feb. 1981 p 97-108 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N83-22868 Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Dept. of National Development and Energy.
ATLAS OF ISOSEISMAL MAPS OF AUSTRALIAN EARTHQUAKES
I. B. Everingham, comp., A. J. McEwin, comp., D. Denham, comp., and J. S. Atkins, ed. 1982 182 p refs
(BMR-BULL-214; ISBN-0-644-0189-68; ISSN-0084-7089) Copyright. Avail: Issuing Activity

Intensity maps for all known Australian earthquakes are provided. A total of 83 isoseismal maps are presented for 70 Australian earthquakes. Author

N83-22869 Academy of Sciences (USSR), Moscow. Space Research Inst.
A TERRESTRIAL EXPERIMENT TO MEASURE THE GRAVIMAGNETICAL FIELD OF THE EARTH
V. B. Braginsky and A. G. Polnarev [1981] 17 p refs
(Rept-745) Copyright. Avail: Issuing Activity

Rotational effects, connected with a whirl type gravitational field, which is similar to the magnetic field in electrodynamics ('gravimagnetic' field), are addressed. Author

N83-22870*# California Inst. of Tech., Pasadena. Seismological Lab.
THE P-WAVE UPPER MANTLE STRUCTURE BENEATH AN ACTIVE SPREADING CENTER: THE GULF OF CALIFORNIA
Marianne C. Walck 30 Mar. 1983 62 p refs
(Grant NsG-7610)
(NASA-CR-170166; NAS 1.26:170166) Avail: NTIS HC A04/MF A01 CSCL 08G

Detailed analysis of short period travel time, and waveform data reveals the upper mantle structure beneath an oceanic ridge to depths of 900 km. More than 1400 digital seismograms from earthquakes in Mexico and central America recorded at SCARLET yield 1753 travel times and 58 direct measurements of short period travel time as well as high quality, stable waveforms. The 29 events combine to form a continuous record section from 9 deg to 40 deg with an average station spacing of less than 5 km. First the travel times are inverted. Further constraints arise from the observed relative amplitudes of mantle phases, which are modeled by trial and error. Author

N83-22871*# Polytechnic Inst. of New York, Brooklyn.
A MORPHOLOGICAL STUDY OF WAVES IN THE THERMOSPHERE Final Report, 1 Jul. 1978 - 31 Dec. 1982
Stanley H. Gross Mar. 1983 127 p refs
(Grant NsG-5284)
(NASA-CR-170189; NAS 1.26:170189) Avail: NTIS HC A07/MF A01 CSCL 04A

Large scale waves in the ionosphere, gravity waves in the thermosphere, and large scale waves in the thermosphere observed by AE satellites are discharged. For individual titles, see N83-22872 through N83-22873.

N83-22872*# Polytechnic Inst. of New York, Brooklyn.
GRAVITY WAVES IN THE THERMOSPHERE OBSERVED BY THE AE SATELLITES Final Report, 1 Jul. 1978 - 31 Dec. 1982
S. H. Gross, C. A. Reber, and F. T. Huang (Computer Sciences Corp., Silver Spring, Md.) *In its* A Morphological Study of Waves in the Thermosphere Mar. 1983 21 p refs Prepared in cooperation with NASA. Goddard Space Flight Center (For primary document see N83-22871 12-46)
(POLY-MRI-1426-82) Avail: NTIS HC A07/MF A01 CSCL 04A

Atmospheric Explorer (AE) satellite data were used to investigate the spectra characteristics of wave-like structure observed in the neutral and ionized components of the thermosphere. Power spectral analysis derived by the maximum entropy method indicate the existence of a broad spectrum of scale sizes for the fluctuations ranging from tens to thousands of kilometers. Author

N83-22873*# Polytechnic Inst. of New York, Brooklyn.
LARGE SCALE WAVES IN THE THERMOSPHERE OBSERVED BY THE AE-C SATELLITE Final Report, 1 Jul. 1978 - 31 Dec. 1982
S. H. Gross, C. A. Reber, and F. T. Huang (Computer Sciences Corp., Silver Spring, Md.) *In its* A Morphological Study of Waves in the Thermosphere Mar. 1983 82 p refs Prepared in cooperation with NASA. Goddard Space Flight Center (For primary document see N83-22871 12-46)
Avail: NTIS HC A07/MF A01 CSCL 04A

Atmospheric Explorer C (AE-C) data are analyzed to study wavelike perturbations in the thermosphere at an altitude of about 260 km. Four geophysical parameters are analyzed. These are nitrogen and oxygen densities, electron density and ion temperature as measured by three different instruments on board AE-C. The data are processed by normalizing them to their average values and their fluctuations are obtained by passing the normalized data through a high pass filter. These fluctuations exhibit strong periodicities that persist throughout the records, regardless of the

filter cutoff frequency. The fluctuations are cross correlated by direct comparison, by comparison of their spectral content as obtained by the MEM and FFT, and by computing cross correlation functions. Author

N83-22874*# California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
SUBDUCTED SLABS AND THE GEOID: CONSTRAINTS ON MANTLE RHEOLOGY AND FLOW
Bradford H. Hager 15 Apr. 1983 49 p refs
(Grants NsG-7610; NSF EAR-82-06528)
(NASA-CR-170192; NAS 1.26:170192; Contrib-3678) Avail: NTIS HC A03/MF A01 CSCL 08G

The total geoid anomaly which is the result of a given density contrast in a convecting viscous earth is affected by the mass anomalies associated with the flow induced deformation of the upper surface and internal compositional boundaries, as well as by the density contrast itself is discussed. If the internal density contrasts can be estimated, the depth and variation of viscosity with depth of the convecting system can be constrained. The observed long wavelength geoid is highly correlated with that predicted by a density model for seismically active subducted slabs. The amplitude of the correlation is explained if the density contrasts associated with subduction extend into the lower mantle or if subducted slabs exceeding 350 km in thickness are piled up over horizontal distances of thousands of km at the base of the upper mantle. Mantle wide convection in a mantle that has a viscosity increasing with depth provides the explanation of the long-wavelength geoid anomalies over subduction zones. E.A.K.

N83-22875# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TID'S COMPRISED WITHIN A GLOBAL UPPER ATMOSPHERE DYNAMICS SYSTEM
C. J. Zamlutti Feb. 1983 16 p refs Submitted for publication
(INPE-2648-PRE/264) Avail: NTIS HC A02/MF A01

This paper suggests a simple mechanism as an alternative approach in the study of TID's. These phenomena are interpreted as resulting from the 'response' of the global upper atmosphere dynamics system whenever energy differences tend to break its internal equilibrium. Seasonal characteristics are discussed as one of such differences. Author

N83-22876# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TROPOSPHERIC OZONE: AN INTERPRETATION OF LOW LATITUDE DATA
V. W. J. H. Kirchhoff Mar. 1983 18 p refs Submitted for publication Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-2664-PRE/274) Avail: NTIS HC A02/MF A01

Low latitude tropospheric ozone shows a rather pronounced peak of ozone density between about 3 and 5 km. The establishment of the average density profile by either simple stratospheric injection, or a net local tropospheric ozone production is considered. It is shown that the natural variability of the ozone data occur at different heights depending on the assumed mechanism. The Natal (Brazil) data set and an independent data set taken at Ft. Sherman (Panama) indicate the existence of a net ozone production between the upper boundary of about 13 km and the region of the peak between 3 and 5 km. E.A.K.

N83-22877# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
IONOSPHERIC EFFECTS OBSERVED DURING THE BIME (BRAZILIAN IONOSPHERIC MODIFICATION EXPERIMENTS) CAMPAIGN OVER FERNANDO DE NORONHA AND FORTALEZA
M. A. Abdu, J. H. A. Sobral, I. J. Kantor, R. Ramirez, and P. R. G. Alves Mar. 1983 49 p Presented at the BIME Meeting, Boston, 3-10 Mar. 1983 Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Technologico
(INPE-2660-PRE/272) Avail: NTIS HC A03/MF A01

Two scanning 6300A photometers, an HF ionosonde and a VHF electronic polarimeter were operated. Special soundings were carried out also by the ionosonde. Observations with these instruments were taken during all the four rocket chemical release experiments, namely, the explosive chemical releases to create electron hole and the metallic vapor release experiments carried out in an attempt to initiate plasma bubble formation in the evening equatorial ionosphere. The photometers detected immediate effects from the chemical release experiments, namely, significant enhancements in the 6300A emission following the detonations and their subsequent decays. They did not, however, detect plasma bubble developments as an after effect of the chemical release experiments. The ionosonde and polarimeter did observe plasma bubble and spread F irregularity developments and their eastward motions shortly following the chemical release, in all the four experiments. Author

N83-22878# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SALINITY AND CHEMICAL WEATHERING RATE OF ROCKS IN A SEMI-ARID REGION
L. M. Moreira Nordemann Feb. 1983 33 p refs Presented at the 1st Simposio do Semi-Arido, Olindo, Brazil, Aug. 1982
(INPE-2647-PRE/263) Avail: NTIS HC A03/MF A01

Rain and river water samples were collected during one year in the Salgado River Basin, a semiarid region in Bahia State, Brazil. The Na, Ca, and K and Mg concentrations and U and total dissolved salts contents in river water, rocks and soils of the basin were measured. A geochemical balance and the chemical weathering of rocks was determined. The water of Salgado River shows high concentration of the total dissolved salts (1,42 g/l) making it impossible to determine the chemical weathering rate of rocks by using the major catons as tracer elements. The results of 36 t/sq km-yr was obtained by using uranium as natural tracer. E.A.K.

N83-22879# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ATMOSPHERIC SODIUM CHEMISTRY AND DIURNAL VARIATIONS: AN UPDATE
Volker W. J. H. Kirchhoff Mar. 1983 17 p refs Submitted for publication
(INPE-2683-PRE/285) Avail: NTIS HC A02/MF A01

Recent results for sodium reaction rates have led to a reassessment of the importance of atmospheric sodium constituents and their distribution with height. The largest changes occur at the bottom of the neutral atmospheric sodium layer. A much larger reaction rate coefficient for the three body production of NaO2 makes this constituent potentially much more dense below about 80 km, whereas the inclusion of photolysis produces a large diurnal variation in the NaOH loss frequency. Because many of the Na reaction rates are still uncertain Sze et al. (1982) have made static calculations for four different options on reaction rates. It is shown that only one of these choices is able to produce diurnal variations that are in agreement with recent measurements. B.W.

N83-22880# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GEOLOGIC MAPPING OF THE ARAGUAINHA DOME USING REMOTE SENSING TECHNIQUES M.S. Thesis [MAPEAMENTO GEOLOGICO DO DOMO DE ARAGUAINHA UTILIZANDO TECNICAS DE SENSORIAMENTO REMOTO]
Alvaro Penteado Crosta Jan. 1983 127 p refs In PORTUGUESE; ENGLISH summary Original contains color illustrations
(INPE-2626-TDL/109) Avail: NTIS HC A07/MF A01

The geological mapping of the Araguainha Dome structure through the utilization of remote sensing products and the search of elucidative evidences, of its origin and age are discussed. It is shown that the validity of the combined utilization of different remote sensing products in geological mapping was possible. It is concluded that the Araquainha dome is an astrobleme which was

formed between 195-260 m.y. ago, from the impact of a celestial body (asteroid or comet) against the Earth's surface. E.A.K.

N83-22881*# Environmental Research and Technology, Inc., Concord, Mass.
VARIATIONS IN ATMOSPHERIC ANGULAR MOMENTUM AND THE LENGTH OF DAY Final Report
Richard D. Rosen and David A. Salstein Oct. 1982 92 p refs (Contract NAS5-25870)
(NASA-CR-170502; NAS 1.26:170502; ERT-A345-T2) Avail: NTIS HC A05/MF A01 CSCL 04A

Six years of twice daily global analyses were used to create and study a lengthy time series of high temporal resolution angular momentum values. Changes in these atmospheric values were compared to independently determined charges in the rotation rate of the solid Earth. Finally, the atmospheric data was examined in more detail to determine the time and space scales on which variations in momentum occur within the atmosphere and which regions are contributing most to the changes found in the global integral. The data and techniques used to derive the time series of momentum values are described. S.L.

N83-22882# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATION OF TRANSIENT WAVES IN THE SOUTHERN HEMISPHERE M.S. Thesis [UM ESTUDO OBSERVACIONAL SOBRE AS ONDAS TRANSIENTES NO HEMISFERIO SUL]
Maria Helena deCarvalho Feb. 1983 65 p refs In PORTUGUESE; ENGLISH summary
(INPE-2646-TDL/117) Avail: NTIS HC A04/MF A01

Intermediate range transient waves were studied. Spatial correlations of the meridional wind component show that the waves always propagate eastward. At 250 mb, the waves have a zonal wavelength, at middle latitudes, of 4000 km in winter and of 4600 km in summer. A cross spectrum analysis was performed. Meridional phase velocities are Northwards, which, combined with eastward phase velocities imply a NW-SE tilt to the trough and ridge axes. Group velocities, estimated from Hovmoller diagrams, compare well with those computed through Rossby's theory. E.A.K.

N83-22883# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATION OF BLOCKING IN THE SOUTHERN HEMISPHERE M.S. Thesis [EM ESTUDO OBSERVACIONAL SOBRE OS SISTEMAS DE BLOQUEIO NO HEMISFERIO SUL]
Darci Pegoraro Casarin Feb. 1983 76 p refs In PORTUGUESE; ENGLISH summary
(INPE-2638-TDL/114) Avail: NTIS HC A05/MF A01

Blocking in the Southern Hemisphere, for the period 1975-1979 was studied. It is found that the region east of Australia is most important region of the Southern Hemisphere for the formation of blocking. The Central Pacific Ocean is another important area with a maximum occurrence in summer. In the region of South America, autumn is the period of greatest occurrence of blocking. The mean duration of blocking in this region, is less than that over Australia and the Pacific Ocean. The identification of a blocking situation allows forecasts, within the blocking region and somewhat to the east, to be extended. E.A.K.

N83-22884# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A GLOBAL BAROTROPIC SPECTRAL MODEL WITH INITIALIZATION BY NORMAL MEANS [UM MODELO ESPECTRAL BAROTROPICO GLOBAL COM INICIACAO POR MODOS NORMAIS]
Jose Paulo Bonatti and Pedro Leite Silva Dias Mar. 1983 112 p refs In PORTUGUESE; ENGLISH summary
(INPE-2674-RPE/428) Avail: NTIS HC A06/MF A01

A spectral barotropic nonlinear primitive equation model on the sphere, which uses the normal modes of the linearized version is described. The coupled system of partial differential equations is transformed to a system of coupled ordinary differential equations, which governs the temporal evolution of the expansion coefficients. Four numerical methods for the solution of this system and their linear stabilities are discussed: centered in time, semiimplicit, prediction correction and semianalytic. The final choice is the semianalytic, because it describes properly the process of energy dispersion by fast linear waves, which are important for the mass flow adjustment problem. The initialization procedures of the model can both be linear and nonlinear. In the last case, the gravitational component is determined prescribing the initial tendency of gravity waves production as zero. E.A.K.

N83-22885*# California Univ., Santa Barbara. Geography Remote Sensing Unit.
NEOTECTONICS OF THE SAN ANDREAS FAULT SYSTEM, BASIN AND RANGE PROVINCE JUNCTURE Progress Report, 1 May 1981 - 30 Oct. 1982
John E. Estes and John C. Crowell [1982] 13 p
(Grant NAG5-177)
(NASA-CR-170202; NAS 1.26:170202) Avail: NTIS HC A02/MF A01 CSCL 08G

The development, active processes, and tectonic interplay of the southern San Andreas fault system and the basin and range province were studied. The study consist of data acquisition and evaluation, technique development, and image interpretation and mapping. Potentially significant geologic findings are discussed. E.A.K.

N83-22886*# California Inst. of Tech., Pasadena.
THE ENERGY RELEASE IN EARTHQUAKES, AND SUBDUCTION ZONE SEISMICITY AND STRESS IN SLABS Ph.D. Thesis
Marios Simou Vassiliou 1983 349 p refs
(Grant NsG-7610)
(NASA-CR-17022; NAS 1.26:17022) Avail: NTIS HC A15/MF A01 CSCL 08K

Energy release in earthquakes is discussed. Dynamic energy from source time function, a simplified procedure for modeling deep focus events, static energy estimates, near source energy studies, and energy and magnitude are addressed. Subduction zone seismicity and stress in slabs are also discussed. Author

N83-22887# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Science and Technology Lab.
THE STRUCTURE AND ENERGY BUDGET OF THE HEAT LOW OVER THE EMPTY QUARTER IN SAUDI ARABIA DURING MAY 1979 Final Report
D. W. Blake, T. N. Krishnamurti, S. V. Low-Nam, and J. S. Fein (NSF) Sep. 1982 47 p refs Prepared in cooperation with Florida State Univ., Tallahassee
(Grant NSF ATM-78-19363)
(AD-A122569; NORDA-TN-170) Avail: NTIS HC A03/MF A01 CSCL 20/13

In this paper we present an analysis of a unique data set over the desert area of Saudi Arabia during the northern summer months. The data set comes from the GARP Monsoon Experiment. The paper addresses the thermodynamic budget over the heat low. We examine the role of the horizontal and vertical advective processes, radiative processes, and the vertical eddy flux convergence in the maintenance of the tropical stratification. Satellite observations show that the desert area experiences a net loss of radiation to outer space, while the thermal stratification remains nearly invariant from one day to the next. This study shows that a crucial element in the maintenance of the stratification is the import of heat into this region in the tropical upper troposphere. This energy supply most likely comes from planetary scale divergent circulations. GRA

N83-22888# Naval Research Lab., Washington, D. C. Geophysical and Plasma Dynamics Branch.
MECHANISMS OF STRATOSPHERIC OZONE TRANSPORT Interim Report
R. B. Rood (Science Applications, Inc.) and M. R. Schoeberl 3 Dec. 1982 177 p refs
(RR0330242)

(AD-A122609; NRL-MR-4969) Avail: NTIS HC A05/MF A01 CSCL 04/1

Two beta-plane planetary wave models are used to study ozone transport in the stratosphere. In the first model, ozone transport is calculated for steady, dissipative planetary waves using the Eulerian, Lagrangian-mean, and residual circulations. A Lagrangian model of parcel dynamics is used to interpret planetary wave-photochemistry interaction. In chemically active regions the mean field ozone changes are found to be significant only where there are large gradients in chemical sources and sinks along particle trajectories. The largest changes in the mean field are found in the lower stratosphere and are due to the Lagrangian-mean advection. In the second model, ozone transport is calculated for the combined diabatic and time dependent planetary wave circulations. Both circulations are instrumental in the formation of the polar spring ozone maximum. The diabatic circulation transports ozone into the lower stratosphere, and planetary waves transport large amounts of ozone northward during sudden and final warnings. Using the transport mechanisms revealed in these models, a scenario is deduced to explain observed large scale ozone transport phenomena. Author (GRA)

N83-22889# Texas A&M Univ., College Station. Center for Tectonophysics.

MECHANICAL AND TRANSPORT PROPERTIES OF ROCKS AT HIGH TEMPERATURES AND PRESSURES. TASK 1: THE PHYSICAL NATURE OF FRACTURING AT DEPTH Technical Progress Report, 1 Mar. - 30 Oct. 1982

N. L. Carter Nov. 1982 50 p

(Contract DE-AS05-79ER-10361)

(DE83-003576; DOE/ER-10361/3-1; TPR-3) Avail: NTIS HC A03/MF A01

Experiments were carried out to determine the effect of quartz on the flow of granite under varying conditions of stress, temperature, and moisture. GRA

N83-22890# Brookhaven National Lab., Upton, N. Y.

TEMPORAL AND SPATIAL VARIABILITY OF AMMONIA CONCENTRATIONS IN THE NON-URBAN TROPOSPHERE

A. L. Tanner 1982 5 p refs Presented at 2nd Symp. on the Composition of Nonurban Troposphere, Williamsburg, Va., 25 May 1982

(DE82-009929; BNL-30967; CONF-820529-1) Avail: NTIS HC A02/MF A01

A body of data on ammonia concentrations in the nonurban boundary layer troposphere is presented. Measurements were made using a continuous method employing liquid phase scrubbing, chemical derivatization and fluorescence. The purpose was to explore the range of tropospheric ammonia levels observed in the NE North American continent, and to evaluate the diurnal and seasonal variations in ammonia concentrations and their relationship to temperature and other meteorological variables. Predominantly ground level ammonia concentrations are reported, although some preliminary data from airborne sampling were obtained. Results indicate that ammonia concentrations seldom exceed 10 ppB for locations not directly impacted by industrial or urban plumes. There is also considerable spatial variability. DOE

N83-22891# California Univ., Berkeley. Lawrence Berkeley Lab.

SUMMARY OF RESULTS OF SPECTRAL AND ANGULAR SKY RADIATION MEASUREMENT PROGRAM

Mario Martin and Paul Berdahl Aug. 1982 13 p refs Presented at the Passive and Hybrid Solar Energy Update Conf. Washington, D.C., 15 Sep. 1982

(Contract DE-AC03-76SF-00098)

(DE83-001553; LBL-14913; CONF-820940-4) Avail: NTIS HC A02/MF A01

Results for a series of more than 50 thousand spectral infrared sky radiation measurements made in 6 US cities were analyzed. An empirical equation is developed to disaggregate the total sky emissivity into its spectral and angular components. This information is relevant to the performance of radiative cooling systems. DOE

N83-22892# Oregon State Univ., Corvallis. School of Oceanography.

OBSERVATIONS OF VOLCANIC TREMOR AT MOUNT SAINT HELENS VOLCANO

Michael Fehler 25 Jun. 1982 39 p refs

(Contract DE-AT06-82ER-12017)

(DE83-004902; DOE/ER-12017/4) Avail: NTIS HC A03/MF A01

Digital recordings of ground motion during tremor episodes accompanying eruptions at Mt. St. Helens Volcano in the state of Washington are studied. The spectra of the vertical component waveforms contain at least two dominant peaks at 1.0 and 1.3 Hz for all events recorded during both eruptions that were studied. Spectra of horizontal ground motion show peaks at .9 and 1.1 Hz. The relative amplitudes of the two peaks changes between tremor episodes and during single tremor episodes and show no consistent relation to amplitude of ground motion. Spectra of long period earthquakes are very similar to those of tremor events suggesting that tremor is composed of many long period earthquakes that occur over a period of time. The path effect of tremor waveforms is small since there are no peaks in the spectra of waveforms recorded during tectonic earthquakes occurring in the vicinity of Mt. St. Helens. Amplitudes of ground motion varies between .11 (SIGMA) and 4.7 (SIGMA)m. Seismic moment rates during the two eruptions are calculated. DOE

N83-22893# Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.

PETROGRAPHIC CHARACTERIZATION OF KENTUCKY COALS Quarterly Progress Report, Jun. - Aug. 1982

J. C. Hower, J. C. Ferm, J. C. Cobb, E. J. Trinkle, K. A. Frankie, S. H. Poe, D. N. Baynard, A. M. Graese, and R. P. Raione 1982 15 p refs

(Contract DE-FG22-80PC-30223)

(DE83-000016; DOE/PC-30223/5) Avail: NTIS HC A02/MF A01

The project Petrographic Characterization of Kentucky Coals consists of three specific areas of coal petrology: spectral fluorescence of liptinite macerals, properties of semi-inert macerals, and size/form/microlithotype association of pyrite/marcasite. Additional research on the Mannington and Dunbar coals in western Kentucky and the Alma coal zone in eastern Kentucky will apply techniques developed in the first three areas. Suites of coals from other states will also be studied to expand the variability in the sample set. DOE

N83-22894# National Academy of Sciences - National Research Council, Washington, D. C. Commision on Physical Sciences, Mathematics, and Resources.

EARTH SCIENCE INVESTIGATIONS IN THE UNITED STATES ANTARCTIC RESEARCH PROGRAM (USARP) Progress Report, 1 Jul. 1981 - 30 Jun. 1982

David H. Elliot, comp. 1982 96 p refs

(Grant NSF DPP-82-07098)

(PB83-118851) Avail: NTIS HC A05/MF A01 CSCL 08G

Information on earth sciences research activities conducted as part of the U.S. Antarctic research program and on publications based on this research is reported. This information was obtained by means of questionnaires distributed to participants in the U.S. Antarctic earth science program. GRA

N83-22895# Sveriges Geologiska Undersoekning, Uppsala.

THE PLEISTOCENE/HOLOCENE BOUNDARY IN SOUTH-WESTERN SWEDEN

Eric Olausson, ed. 1982 291 p refs

(PB83-109538; SGU-C-794) Avail: NTIS HC A13/MF A01 CSCL 08G

The boundary between the Pleistocene/Holocene epochs was placed at 10,000 C(14) years B.P. (Libby half time) by the Holocene Commission. In search of a stratotype locality three cores from the province of Bohusian, south-western Sweden, were scrutinized concerning different geophysical, geochemical and bioastratigraphical parameters. The marine sequences of the cores from Moltemyr and Solberga reveal a distinct boundary and a transition zone respectively which meet the requirements laid down by the

Holocene Commission. The suggested age of the lithological boundary is c. 10,200-10,300 years B.P. GRA

N83-22896# CER Corp., Las Vegas, Nev.
A GEOLOGIC STUDY OF THE MICHIGAN BASIN Topical Report, Jul. 1981 - May 1982
Richard E. Peterson May 1982 23 p refs
(PB83-136291; GRI-81/0025.5) Avail: NTIS HC A02/MF A01 CSCL 08G

The Michigan Basin contains sediments from Cambrian through Pennsylvanian age. The geologic basin is of greatest depth in Central Michigan with approximately 15,000 ft of strata. To assess efficiently which formations have suitable reservoir characteristics to be included in the Gas Research Institute tight gas sands program, a catalog of the lower-permeability formations and their characteristics was required. The lack of geologic units that were considered to have sufficient extent reservoir characteristics or gas reserves to be of interest as blanket-like gas sands precluded a more detailed inventory and characterization. An overview of all gas productive formations in the Michigan Basin is given. GRA

N83-22897# CER Corp., Las Vegas, Nev.
A GEOLOGIC STUDY OF THE ILLINOIS BASIN Topical Report, Jul. 1981 - May 1982
Richard E. Peterson May 1982 16 p refs
(PB83-136309; GRI-81/0025.6) Avail: NTIS HC A02/MF A01 CSCL 08G

The lower permeability gas bearing formations, exclusive of gas-productive shale formations, within the Illinois Basin were characterized. Natural gas is a minor part of the hydrocarbons produced in the Illinois Basin. Most of the gas production is casing heat gas from oil wells; occurring much less frequently are gas cap reservoirs or gas unassociated with oil. The dominant gas productive formations in the Illinois Basin are summarized including brief geologic characterizations and a review of exploration activity. GRA

N83-22898# Stanford Univ., Calif. Dept. of Geophysics.
PERMEABILITY AND ELASTIC WAVE VELOCITY AND ATTENUATION OF TIGHT POROUS ROCK Annual Report, Jul. 1981 - Jul. 1982
Amos Nur Jul. 1982 28 p refs Sponsored by Gas Research Institute
(PB83-136317; GRI-81/0100) Avail: NTIS HC A03/MF A01 CSCL 08G

Seismic waves in tight gas sandstones to determine partial gas saturation in situ from logs were investigated. The effects of water and its salinity on gas flow in tight gas sandstones to estimate in situ gas permeability are studied. A completely computer controlled pulse-decay permeability is designed and constructed. GRA

N83-22899# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
US LAND GRAVITY
Allen M. Hittelman, Donald Scheibe (DOD Gravity Services), and Clyde Goad (National Geodetic Survey) 1982 30 p refs
(PB83-118836) Avail: NTIS HC A03/MF A01 CSCL 08E

Contents include gravity library operations at the Department of Defense; gravity operations at the National Geodetic Survey; gravity services of the National Geophysical Data Center; gravity station data formats; marine gravity data; topographic data. Catalogs published in the key to geophysical records documentation (KGRD) series are listed. Author

N83-22900# Swedish Detonic Research Foundation, Stockholm.
CONTROLLED ECCENTRICITY IN COMPRESSIVE STRENGTH TESTS OF ROCK MATERIAL
Gunnar Wijk 22 Jul. 1982 13 p refs
(PB83-109520; DS-1982:6) Avail: NTIS HC A02/MF A01 CSCL 08G

Controlled load eccentricity in uniaxial compressive strength was deliberately increased and the apparent strength decreases were studied. The rate of decrease is found to be smaller than expected from an elementary stress analysis. Previous experimental results showing that the strength is independent of load eccentricity for the small but unavoidable eccentricities in normal noneccentric tests are confirmed. GRA

N83-22901# Swedish Detonic Research Foundation, Stockholm.
CRACK INITIATION AROUND PRESTRESSED ROCK BOLTS
Gunnar Wijk 22 Jul. 1982 19 p refs
(PB83-113936; DS-1982:7) Avail: NTIS HC A02/MF A01 CSCL 08G

The stress fields in the rock in the immediate vicinities of the ends of prestressed rock bolts are considered. In particular, the tensile stresses that are likely to initiate cracks are studies. A fracture mechanics analysis shows that if cracks are initiated they will normally not be extended more than a few bore hole diameters and cause negligable reduction of the tensile force in the rock bolts. It is suggested that the initiated cracks can be considerably extended by blasting activities in the neighborhood and accordingly cause loss of bolt tension. If so retensioning of the rock bolts is quite meaningless. GRA

N83-22902# National Bureau of Standards, Washington, D.C.
PHYSICAL PROPERTIES DATA FOR BASALT Final Report
Lewis H. Gevantman Sep. 1982 765 p refs Sponsored in part by Battelle Project Management Div.
(PB83-115311; NBSIR-82-2587) Avail: NTIS HC A99/MF A01 CSCL 08G

Experimental data and associated information on the thermodynamic, mechanical, thermophysical, and electrical properties of basalts from various locations in the United States and abroad are completed. The thermodynamic properties include the chemical characterization of basalts, heat capacity, relative enthalpy, entropy, Gibbs energy, and molar volume. A summing procedure for obtaining values of heat capacity and calorimetric entropy above 298 K is introduced. GRA

N83-22903# CER Corp., Las Vegas, Nev.
A GEOLOGIC STUDY OF THE RATON BASIN Topical Report, Jul. 1981 - Jul. 1982
James M. Gromer Jul. 1982 58 p refs
(PB83-136275; GRI-81/0025.2) Avail: NTIS HC A04/MF A01 CSCL 08G

Within the Raton Basin, some Cretaceous sediments have been identified as containing blanket-like sands, i.e., the Trinidad and Dakota Sandstones, which are thick and widespread and contain natural gas reserves. These reservoirs would probably require well stimulation and fracturing to make them economically feasible. In addition to identifying low-permeability, gas-bearing blanket-like formations, this report provides a compilation of industry activity and production within the study area. In addition, it briefly reviews geological and operational information as an aid in evaluating the study area for future tight gas sands research. The Raton Basin currently does not have commercial gas production although several gas shows have been encountered. GRA

N83-22904# CER Corp., Las Vegas, Nev.
A GEOLOGIC STUDY OF THE BLACK WARRIOR BASIN Topical Report, Jul. 1981 - May 1982
Richard E. Peterson May 1982 36 p refs Sponsored by Gas Research Inst.
(PB83-136283; GRI-81-0025.4) Avail: NTIS HC A03/MF A01 CSCL 08G

The lower-permeability gas-bearing formations within the Black Warrior Basin are discussed. To assess efficiently which formations have suitable reservoir characteristics to be included in the tight gas sands program, the lower-permeability formations were characterized. The general basin geology was also summarized. The characterized reservoir units include a summary of the regional geologic setting, hydrocarbon distribution and production, exploration activity and pipeline availability. Within the study area, the Lower Mississippian Carter Sandstone may have sufficient extent,

reservoir characteristics and gas reserves to be of interest to the tight gas sands program. GRA

N83-22905# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solid Earth Geophysics.
DIRECTORY OF WORLD DIGITAL SEISMIC STATIONS
Robert Ganse and Charles R. Hutt (Geological Survey) Aug. 1982 408 p refs
(PB83-119933; SE-32) Avail: NTIS HC A18/MF A01 CSCL 08K

Digital recording seismographs have become one of the most important tools of modern research seismology. Digital recording has helped to increase both the dynamic range and the resolution of seismic measurements, as well as facilitating automatic routine measurements and computations. A proliferation of digital seismic stations has grown up in recent years, supported and operated by various agencies in countries around the world. These include networks and arrays as well as single stations. This publication is intended as a first attempt to catalog these digital stations, networks, and arrays into an organized format so that potential data uses will at least know of their existence. Author (GRA)

N83-22906# Idaho Univ., Moscow. Water and Energy Resources Research Inst.
FROZEN SOIL EFFECTS ON THE EROSION HAZARD
En Shen Yen and Myron Moinau Apr. 1982 72 p refs
(PB83-125187; W83-00615; OWRT-A-070-IDA(1)) Avail: NTIS HC A04/MF A01 CSCL 08M

A study was conducted to ascertain whether erosion and sediment yield affected by frozen soil are usually worse than on unfrozen soil, and if erosion severity in early winter affected erosion severity in late winter or spring. Changes in surface roughness of three soil plots were determined as a function of freeze-thaw cycles. Runoff energy (RE) and sediment yield (SY) were classified relative to their occurrence on frozen thawing, or unfrozen soil. Significant differences occurred in RE and SY from runoff on thawing/frozen soils was the same, and was significantly different from rain on unfrozen soil. Author (GRA)

N83-22907# National Oceanic and Atmospheric Administration, Rockville, Md. Air Resources Lab.
RESULTS OF A SUNPHOTOMETER INTERCOMPARISON HELD AT BOULDER, COLORADO, 19 OCTOBER TO 16 DECEMBER 1981
Ellsworth Dutton and John Deluisi Jun. 1982 52 p refs
(PB83-111500; NOAA-TM-ERL-ARL-114; NOAA-82092203) Avail: NTIS HC A04/MF A01 CSCL 04A

Total atmospheric optical depths as derived from quasi-simultaneous observations by 12 modern sun-photometers of 5 different designs are intercompared. The relative agreement between instruments depends on the calibration of the instruments and is given for two different calibration procedures. When the self-calibration procedure by the Langley-plot technique was used, the instrument agreed only to within + or - 10%; however, when the instruments were all calibrated relative to a reference standard (the consensus of the Langley-plot calibration values) the agreement was on the order of + or - 1.5%. The measurements were made at 380 and 500 nm, typical turbidity measurement wavelengths. The impact of the relative instrument agreement on possible errors in aerosol optical depth calculations is discussed. GRA

N83-22671# Hokkaido Univ., Sapporo (Japan).
PORE-WATER PRESSURE PROFILE IN FREEZING POROUS ROCKS
Masami Fukuda and Tomokazu Matsuoka *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 217-224 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22683# Joint Publications Research Service, Arlington, Va.
GEOPHYSICAL METHODS IN OIL AND GAS PROSPECTING
In its USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 33-35 Transl. into ENGLISH from Pravda (Moscow), 4 Aug. 1982 p 2 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

N83-22684# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON MASSA EXPERIMENT
A. Gorokhov *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 36-38 Transl. into ENGLISH from Pravda (Moscow), 30 Nov. 1982 p 6 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N83-22908*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-5) LAUNCH
D. L. Johnson, C. K. Hill, and G. W. Batts Mar. 1983 58 p refs
(NASA-TM-82515; NAS 1.15:82515) Avail: NTIS HC A04/MF A01 CSCL 04B

This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-5 launch time on November 11, 1982, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of prelaunch Jimsphere measured vertical wind profiles is given in this report. Also presented are the wind and thermodynamic parameters measured at the surface and aloft in he SRB descent/impact ocean area. Final meteorological tapes, which consist of wind and thermodynamic parameters versus altitude, for STS-5 vehicle ascent and SRB descent have been constructed. The STS-5 ascent meteorological data tape has been constructed by Marshall Space Flight Center in response to Shuttle task agreement No. 936-53-22-368 with Johnson Space Center. Author

N83-22909*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
TOTAL OZONE AND SURFACE TEMPERATURE CORRELATIONS DURING 1972 - 1981
C. L. Parsons Feb. 1983 12 p refs
(NASA-TM-84418; NAS 1.15:84418) Avail: NTIS HC A02/MF A01 CSCL 04B

Ten years of Dobson spectrophotometer total ozone measurements and surface temperature observations were used to construct monthly mean values of the two parameters. The variability of both parameters is greatest in the months of January and February. Indeed, in January there is an apparent correlation between high total ozone values and abnormally low surface temperatures. However, the correlation does not hold in February. By reviewing the history of stratospheric warmings during this period, it is argued that the ozone and surface temperature correlation is influenced by the advection or lack of advection of ozone rich arctic air resulting from sudden stratospheric warmings. S.L.

N83-22910# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
HAHN AB, WEST GERMANY. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report
9 Aug. 1982 500 p
(AD-A122715; AD-E850208; USAFETAC/DS-82-049) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Hahn AB, West Germany. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values; (C) Surface winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum tempera-

tures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperature and relative humidity); and (F) pressure Summary (means, standard, deviations, and observation counts of station pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22911# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

MAXWELL AFB, ALABAMA. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

24 Aug. 1982 500 p

(AD-A122716; AD-E850209; USAFETAC/DS-82-051) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Maxwell AFB, Alabama. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values; (C) Surface winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperature and relative humidity); and (F) pressure summary (means, standard, deviations, and observation counts of station pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22912# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

GRAFENWOHR AAF, WEST GERMANY. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

3 Sep. 1982 500 p

(AD-A122717; AD-E850210; USAFETAC/DS-82-052) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Grafenwohr AAF, West Germany. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values; (C) Surface winds, (D) Ceiling versus Visibility, Sky cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperature and relative humidity); and (F) pressure summary (means, standard, deviations, and observation counts of station pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22913# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

CAMP HUMPHREYS, PYONGTAEK AB, SOUTH KOREA. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

10 Sep. 1982 500 p

(AD-A122718; AD-E850211; USAFETAC/DS-81-053) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Camp Humphreys/Pyongtaek AB, South Korea. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface winds; (D) Ceiling versus Visibility; Sky cover; (E) Psychromettric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations if dry-bulb and dew point temperatures and relative humidity); and (F) pressure Summary (means, standard, deviations, and observation counts of station pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22914# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

RAMSTEIN AB, WEST GERMANY. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

21 Jul. 1982 500 p

(AD-A122709; AD-E850202; USAFETAC/DS-82-043) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Ramstein, AB Germany (West). It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22915# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

BOEING FIELD, SEATTLE, WASHINGTON. REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

27 Jul. 1982 500 p

(AD-A122710; AD-E850203; USAFETAC/DS-82-044) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Boeing Field, Seattle, Washington. It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of dry-bulb, wet bulb and dew point temperatures and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22916# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

SEMBACH AB, GERMANY (WEST). REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PARTS A-F Final Report

28 Jul. 1982 500 p

(AD-A122711; AD-E850204; USAFETAC/DS-82-045) Avail: NTIS HC A21/MF A01 CSCL 04/2

This report is a six part statistical summary of surface weather observations for Sembach AB, Germany (West). It contains the following parts: (A) Weather conditions; Atmospheric phenomena; (B) Precipitation, Snowfall and Snow Depth (daily amounts and extreme values); (C) Surface winds; (D) Ceiling versus Visibility; Sky Cover; (E) Psychrometric Summaries (daily maximum and minimum temperatures, extreme maximum and minimum temperatures, psychrometric summary of wet-bulb temperature depression versus dry-bulb temperature, means and standard deviations of

dry-bulb, wet bulb and dew point temperature and relative humidity); and (F) Pressure Summary (means, standard, deviations, and observation counts of station pressure and sea-level pressure). Data in this report are presented in tabular form, in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurring tables. GRA

N83-22917# Pacific Northwest Lab., Richland, Wash.
SIMPLE NOCTURNAL SLOPE-FLOW DATA FROM THE RATTLESNAKE MOUNTAIN SITE
T. W. Horst, J. C. Doran, J. M. Thorp, R. I. Schreck, and O. P. Gifford, comp. Oct. 1982 103 p
(Contract DE-AC06-76RL-01830)
(DE83-004100; PNL-4406; ASCOT-82-5) Avail: NTIS HC A06/MF A01

Detailed vertical profiles of the wind and temperature structure of nocturnal slope flows were measured at a site that is uniform in the cross slope direction. The upper part of the slope closely approximates a simple, tilted plane. These measurements were made from three towers at different distances from the ridge crest, each of which extended through the local depth of the katabatic flow. The tower wind and temperature data from the four best cases of slope flow are listed, as well as ambient wind and temperature profiles to a height of 300 m from a tethersonde flown at the experimental site and surface winds from a network of stations surrounding the site. DOE

N83-22918# National Severe Storms Lab., Norman, Okla.
THUNDERSTORMS: A SOCIAL, SCIENTIFIC AND TECHNOLOGICAL DOCUMENTARY. VOLUME 2: THUNDERSTORM MORPHOLOGY AND DYNAMICS
Edwin Kessler Feb. 1982 610 p refs
(PB83-124727; NOAA-82092206-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 04B

The form and distribution of thunderstorms and of their associated physical processes: thermal, dynamical, hygrological, and electrical is reported. GRA

N83-22919# National Weather Service, Silver Spring, Md. Hydrometeorological Branch.
APPLICATION OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES: UNITED STATES EAST OF THE 105TH MERIDIAN
E. M. Hansen, L. C. Schreiner, and J. F. Miller Aug. 1982 182 p refs Sponsored in part by the Army Corps of Engineers
(PB83-118166; NOAA-NWS-HR-52) Avail: NTIS HC A09/MF A01 CSCL 04B

This study provides a stepwise approach to the temporal and spatial distribution of probable maximum precipitation (PMP) estimates derived from Hydrometeorological Report No. 51, 'Probable Maximum Precipitation Estimates - United States East of the 105th Meridian'. Included are discussions of the shape and orientation of isohyetal patterns for major rainfalls of record. An elliptical isohyetal pattern with a ratio of major to minor axes of 2.5 to 1 is recommended, and a procedure is outlined for obtaining appropriate isohyet values. Author (GRA)

N83-22920# National Weather Service, Silver Spring, Md. Water Management Information Div.
PERTINENT METEOROLOGICAL AND HURRICANE TIDE DATA FOR HURRICANE CARLA
Aug. 1982 119 p refs
(PB83-118240; NOAA-TR-NWS-32; NOAA-82101104) Avail: NTIS HC A06/MF A01 CSCL 04B

All available meteorological data were analyzed to provide information as accurate as possible for use in dynamic storm surge models. Detailed analyses are presented of the storm track, forward speed, central pressure, and radius to maximum wind. Particular attention is given to the period surrounding landfall. Tide gage and high water mark data are presented to give both a time history and geographic depiction of the storm surge. Author (GRA)

N83-22921# National Weather Service, Silver Spring, Md. Communications Div.
NOAA/NWS CATALOG OF METEOROLOGICAL BULLETINS. SECTION 2. FOREIGN METEOROLOGICAL BULLETINS. COMMUNICATIONS HANDBOOK NO. 6
Sep. 1982 648 p
(PB83-119131; NOAA-82102002) Avail: NTIS HC A99/MF A01 CSCL 04B

This handbook enables users to identify the contents of: various domestic products which are generated by or available through the U.S. National Meteorological Center facilities, various foreign products which are distributed domestically and various aviation-oriented products. GRA

N83-22922# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
BOULDER UPSLOPE CLOUD OBSERVATION EXPERIMENT
Earl E. Gossard Jun. 1982 243 p
(PB83-116673; NOAA-82101203) Avail: NTIS HC A11/MF A01 CSCL 04B

The goals of this observational program were to provide the data base to: learn more about the role of ice crystals in the formation of clouds and precipitation under upslope conditions, calibrate the various remote sensing systems against reliable in situ devices in a steady, homogeneous cloud environment, and to evaluate their practical applicability for observing the role of ice crystals and cloud microphysics in the evolution of upslope precipitation. GRA

N83-22923# Atmospherics, Inc., Fresno, Calif.
THE SCPP DATA COLLECTION AND ANALYSIS Interim Progress Report, 1 Sep. 1981 - 31 Aug. 1982
Mark Solak, Tom Henderson, Rand Allan, Susan Barnes, Mike Henderson, Steve Pinion, Ed Pinion, and Hilda Duckering 27 Aug. 1982 188 p refs
(Contract DI-9-07-85-V0020)
(PB83-116707; IPR-4) Avail: NTIS HC A09/MF A01 CSCL 04B

The data collection and analysis tasks performed within the Sierra Cooperative Pilot Project (SCPP) are described. Data collection and analysis from a network of precipitation gages and ground-based instrumentation for detection of supercooled liquid water are discussed. A research paper prepared as part of the design work, describing precipitation characteristics of SCPP-1 clouds and the precipitation evaluation techniques developed for use in the experiment, is included. GRA

N83-22924# National Weather Service, Silver Spring, Md.
THE NOAA/NWS CATALOG OF METEOROLOGICAL BULLETINS. SECTION 1: KWBC ORIGINATED METEOROLOGICAL BULLETINS (2ND EDITION) Communications Handbook no. 6
Jun. 1982 263 p refs
(PB83-116723; NOAA-82091302) Avail: NTIS HC A12/MF A01 CSCL 04B

Communications Handbook No. 6, the NOAA/NWS Catalog of Meteorological Bulletins, is a three section reference manual. Section 1 contains all meteorological bulletins originated at KWBC. Section 2 contains foreign meteorological bulletins which are distributed domestically. Section 3 contains aviation oriented meteorological bulletins. A description of the bulletins, the approximate time of transmission, generation, observation or valid time, and the code used are listed for each entry. Author

N83-22925# National Weather Service, Silver Spring, Md.
THE NOAA/NWS CATALOG OF METEOROLOGICAL BULLETINS. SECTION 3: AVIATION-ORIENTED METEOROLOGICAL BULLETINS (1ST EDITION) Communications Handbook no. 6
Jun. 1982 167 p refs
(PB83-116731) Avail: NTIS HC A08/MF A01 CSCL 04B

Communications handbook No. 6, the NOAA/NWS Catalog of Meteorological Bulletins, is a three section reference manual. This section contains aviation oriented meteorological bulletins. A description of the bulletins, the approximate time of transmission,

generation, observation or valid time, and the code used are listed for each entry. GRA

N83-22926# National Weather Service, Silver Spring, Md.
NATIONAL WEATHER SERVICE RADAR CODE USER'S GUIDE
Nov. 1982 189 p refs
(PB83-117515; NOAA-82101107) Avail: NTIS HC A09/MF A01 CSCL 04B

Effective November 1, 1982, the National Weather Service adopted a new radar reporting code which is entirely digital. This new code is similar to, but does not replace the one currently used at the four FAA Air Route Traffic Control Centers. An automated radar summary chart is being produced by computer using the coded radar observations. This chart is more timely and accurate than the old handdrawn chart. Three teletypewriter plots, or paper doll messages, are also made based on the radar observations. One is a plot of the current intensities. The other two are 3- and 4-hour intensity sums. This User's Guide contains not only a detailed description of the radar reporting code, including examples, but also descriptions of the automated radar summary chart and the teletypewriter plots. Author (GRA)

N83-22927# National Oceanic and Atmospheric Administration, Rockville, Md. Air Resources Labs.
STRATOSPHERIC THERMOMETRY: AN OVERVIEW AND BIBLIOGRAPHY
Robert H. Cordella, Jr. May 1982 12 p refs
(PB83-115196; NOAA-TM-ERL-ARL-113; NOAA-82081905) Avail: NTIS HC A02/MF A01 CSCL 04B

Stratospheric thermometry is a diverse topic and this short note attempts to impart a flavor of uncertainties arising from atmospheric dynamics, the vehicle/atmosphere interface, and the thermometer itself. The sources cited here should be referenced directly for details; mean and RMS values are usually given, extremes are rarely mentioned but occasionally appear in graphs in source documents. Author (GRA)

N83-22928# National Hurricane and Experimental Meteorology Lab., Coral Gables, Fla.
A COMPILATION OF EASTERN AND CENTRAL NORTH PACIFIC TROPICAL CYCLONE DATA
Gail M. Brown and Preston W. Leftwich, Jr. Aug. 1982 21 p refs
(PB83-115444; NOAA-TM-NWS-NHC-16; NOAA-82080613) Avail: NTIS HC A02/MF A01 CSCL 04B

Dates, tracks, maximum sustained wind speeds (as available), and limited central pressure values of tropical cyclones occurring from 1949 to 1980 in the eastern and central North Pacific Ocean are listed. GRA

N83-22929# National Weather Service, Silver Spring, Md.
NATIONAL VERIFICATION PLAN
Jun. 1982 89 p refs
(PB83-117507; NOAA-82083104) Avail: NTIS HC A05/MF A01 CSCL 04B

The forecast service program of the NWS is very diverse and complex. Users range from the general public, who are interested in forecasts of weather elements such as temperature and precipitation, to specialized businesses that might be interested in much more specialized forecasts. The service areas of the NWS include public, aviation, marine, agriculture, fire weather, air pollution, hydrology, and severe events such as tornadoes, hurricanes, and flash floods. There do exist national programs in which certain weather elements in public forecasts for cities and aviation terminal forecasts are verified. As an initial approach to the formulation of a National Verification Plan, each major program area (i.e., Public, Marine, etc.) was considered separately. Author (GRA)

N83-22930# Texas A&M Univ., College Station. Center for Applied Geosciences.
HURRICANES ON THE TEXAS COAST
Walter K. Henry, Dennis M. Driscoll, and J. Patrick McCormack
May 1982 55 p refs Revised Sponsored by NOAA
(PB83-117994; TAMU-SG-75-504-Rev; NOAA-82101204-Rev) Avail: NTIS HC A04/MF A01 CSCL 04B

The report was designed to help Texas Coast residents understand, plan for, and recover from the devastating effects of hurricanes, or storms. The study describes the climatology for a hurricane, the destruction and recovery methods. GRA

N83-22931# National Weather Service, Kansas City, Mo.
THE EFFECT OF DIURNAL HEATING ON THE MOVEMENT OF COLD FRONTS THROUGH EASTERN COLORADO
James L. Wiesmueller Aug. 1982 20 p refs
(PB83-118463; NOAA-TM-NWS-CR-66; NOAA-82092005) Avail: NTIS HC A02/MF A01 CSCL 04B

A frequently observed phenomenon unique to the Rocky Mountain region is the apparent effect of durnal heating on the movement of cold fronts southward through the High Plains. Fronts may stall or slow across Montana and Wyoming during greatest surface heating, with a marked acceleration southward after sunset. Cold frontal passages seem to occur more often during the nighttime hours in eastern Colorado, especially during the warm season. The propensity toward nighttime frontal passages is recognized among forecasters. The cold frontal passage of October 20-21, 1981 examined. It is shown that for all identifiable cold frontal passages at Denver since 1960, more than two-thirds occurred between the hours of 6p.m. and 6a.m. GRA

N83-22932# National Weather Service, Silver Spring, Md. Office of Meteorology and Oceanography.
NATIONAL WEATHER SERVICE 1981 WATCH/WARNING VERIFICATION: FLASH FLOOD, WINTER STORM AND HIGH WIND
A. Kristine Campbell Jul. 1982 43 p refs
(PB83-118018; NOAA-TN-NWS-FCST-27; NOAA-82091301) Avail: NTIS HC A03/MF A01 CSCL 04B

A better measure of watch/warning forecast performance was developed. The Weather Service forecast offices provided verification logs on flash floods, winter storms and high winds since January 1979. These logs consist of issue time, valid time, lead time, area, verification for watches and warnings, and events that occur in the absence of a watch or warning. A total of 430 flash flood, 86 winter weather and 73 high wind events were reported on the logs in 1981. Collectively, 8% of those events occurred without a watch or warning issued. Of the total warnings disseminated 76% showed positive verification, but 50% of those were issued with an event in progress. GRA

N83-22933# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
SURFACE AND UPPER-AIR OBSERVATIONS IN THE EASTERN BERING SEA, FEBRUARY - MARCH 1981
R. W. Lindsay and A. L. Comiskey Jul. 1982 98 p refs
(PB83-118471; NOAA-TM-ERL-PMEL-35; NOAA-82092204) Avail: NTIS HC A05/MF A01 CSCL 04B

Results of meteorological studies conducted near the edge of the seasonal pack ice in the eastern Bering Sea on the NOAA ship SURVEYOR from 26 February to 10 March 1981 are summarized. Surface air pressure and air temperature analyses are presented including all late reports for 00 and 12 GMT from 23 February to 21 March. Upper-air observations from the SURVEYOR, and St. Paul and Nome, Alaska, are also presented. Cross sections of the potential temperature in the boundary layer which were made as the ship steamed away from the ice during off-ice winds show the warming and deepending of the atmospheric mixed layer. The regional weather conditions encountered during this period are discussed and compared to climatology including the relationship between the atmospheric boundary layer structure and the synoptic weather. Author (GRA)

N83-22934# National Weather Service, Silver Spring, Md.
WEATHER RADAR OBSERVATIONS. PART A: NATIONAL WEATHER RADAR NETWORK OBSERVING AND REPORTING PROCEDURES (EFFECTIVE 1 NOVEMBER 1981)

1 Nov. 1982 46 p refs Sponsored in part by Department of Defense
(PB83-118810; FMH-7) Avail: NTIS HC A03/MF A01 CSCL 04B

The report describes operating and reporting procedures for this network. Author (GRA)

N83-22935# National Oceanic and Atmospheric Administration, Miami, Fla. Research Facilities Center.
RESEARCH FACILITIES REPORT: FISCAL YEAR 1981 Annual Report
Jun. 1982 33 p refs
(PB83-112946; NOAA-82081901) Avail: NTIS HC A03/MF A01 CSCL 04B

The Research Facilities Center (RFC), a member of NOAA's Environmental Research Laboratories, provides instrumented aircraft in support of a variety of atmospheric/oceanic research programs initiated by NOAA elements and other government agencies. The aircraft and their associate research systems, the planning and execution of field programs, the collection of data and their validation, the calibration of the sensors, etc., represent the major efforts of laboratory. The Scientific Instrumentation Group installs, modifies, operates and maintains the airborne research systems. Although the RFC is based in Miami, Florida, its research operations span the globe. GRA

N83-22936# National Weather Service, Kansas City, Mo.
AN OUTLINE OF SEVERE LOCAL STORMS WITH THE MORPHOLOGY OF ASSOCIATED RADAR ECHOES
Robert Grebe Jun. 1982 93 p refs
(PB83-114454; NOAA-TM-NWS-TC-1; NOAA-82090201) Avail: NTIS HC A05/MF A01 CSCL 04B

The interpretation of conventioanl radar data for the identification of severe local storms is discussed. GRA

N83-22937# National Weather Service, Kansas City, Mo.
PROGRAM ALEMBIC
Warren E. Sunkel Mar. 1982 75 p refs
(PB83-114488; NOAA-NWS-CRCP-2; NOAA-82092001) Avail: NTIS HC A04/MF A01 CSCL 04B

The Program ALEMBIC, a general purpose program which was designed to aid forecasters in the transition from preparing observations and forecasts in teletypewriter (TTY) format, is examined. Entry to the Federal Aviation Administration's Weather Message Switching Center, to preparing the same messages in a format for transmission on the National Weather Service's Automation of Field Operations and Services is outlined. GRA

N83-22938# National Weather Service, Silver Spring, Md. National Meteorological Center.
THE NMC SPECTRAL MODEL
Joseph G. Sela May 1982 45 p refs
(PB83-115113; NOAA-TR-NWS-30) Avail: NTIS HC A03/MF A01 CSCL 04B

A model with spectral representation in the horizontal and Arakawa quadratic conserving finite differencing in the vertical is described. The model includes a moisture cycle consisting of large-scale condensation processes, as well as a convective parameterization. Interactions with the underlying oceans include evaporation and sensible heating. Orography and surface friction are modeled and a semi-implicit time integration is employed. Machenhauer's normal modes initialization method is applied. Author (GRA)

N83-22653# Hokkaido Univ., Sapporo (Japan).
COLD AIR FLOW ON THE SNOW SURFACE
Shunichi Kobayashi and Nobuyoshi Ishikawa *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 55-64 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22654# Hokkaido Univ., Sapporo (Japan).
THE SHAPE OF SNOW DRIFTS AND DISTRIBUTION OF WIND SPEED AROUND SNOW FENCES
Renji Naruse *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 65-73 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22656# Hokkaido Univ., Sapporo (Japan).
YEARLY VARIATION IN SNOW ACCUMULATION IN HOKKAIDO, JAPAN
Renji Naruse and Tamotsu Ishida *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 81-88 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22660# Hokkaido Univ., Sapporo (Japan).
A CONTINUOUS MEASURING SYSTEM OF WATER CONTENT IN CLOUD AND FOG BY MEANS OF A MICROCOMPUTER
Tatsuo Endoh, Hiroyuki Konishi, and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 117-128 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22661# Hokkaido Univ., Sapporo (Japan).
STEREOSCOPIC ANALYSES OF CLOUD PATTERNS IN WINTER MONSOON BY SHORT INTERVAL OBSERVATIONS USING GMS-1
Tatsuo Endow, Gorow Wakahama, Shinri Irikawa, Kunihiko Hozumi, and Toshihiro Motoki *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 129-142 refs (For primary document see N83-22648 12-70)
Avail: NTIS HC A11/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N83-22939*# National Aeronautics and Space Administration, Washington, D. C.
NASA OCEANIC PROCESSES PROGRAM Annual Report, 1 Oct. 1981 - 30 Sep. 1982
Watson W. Gregg, ed. Mar. 1983 151 p refs
(NASA-TM-85632; EE-8; NAS 1.15:85632) Avail: NTIS HC A08/MF A01 CSCL 08C

Current flight projects and definition studies, brief descriptions of individual research activities, and bibliography of referred journal articles are provided. Author

N83-22940# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MAPPING OF AREAS FAVORABLE TO YELLOWFIN TUNA OFF NORTHERN AND NORTHEASTERN BRAZIL USING REMOTE SENSING AND OCEANOGRAPHIC DATA M.S. Thesis [MAPEAMENTO DE AREAS FAVORAVEIS A OCORRENCIA DE ALBACORA-DE-LAJE NO NORTE E NORDESTE DO BRASIL COM UTILIZACAO DE SENSORIAMENTO REMOTO E DADOS OCEANOGRAFICOS]
Luiz Arnaud Britto deCastro Jan. 1983 93 p refs In PORTUGUESE; ENGLISH summary Original contains color illustrations (INPE-2632-TDL/112) Avail: NTIS HC A05/MF A01

One attempt is made to map those oceanic areas where environmental conditons are more favorable to yellowfin tuna (Thunnus albacares), using remotely sensed and historical oceanographic data. The study area is delineated by 20 W and 60 W meridians and by 10 N and 20 S parallels. As direct use of infrared images of SMS/GOES satellite was precluded by the heavy and constant cloud cover, GOSSTCOMP charts were used to map sea surface temperatures. Mathematical correlations between catch and oceanographic data showed the limiting values of some oceanographic parameters, for that species, to be: 26 C lower surface temperature, 28.6 C upper surface temperature, 36.8 higher salinity and 5.7 ml/l higher dissolved oxygen. Maximum values of temperature and salinity did not show up inside the area limited by the lower surface temperatures. As the maximum for dissolved

oxygen is not a limiting factor, the best areas for yellowfin tuna (Thunnus albacares), shown on the charts, were discriminated by the lower limits of surface temperature alone. S.L.

N83-22941# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A MODEL OF FISHING CHARTS FOR TUNA OFF SOUTHEASTERN AND SOUTHERN BRAZIL USING OCEANOGRAPHIC DATA AND REMOTE SENSING M.S. Thesis [UM MODELO DE CARTAS DE PSCA PARA TUNIDEOS DO SUDESTE E SUL DO BRASIL UTILIZANDO DADOS OCEANOGRAFICOS E DE SENSORIAMENTO REMOTO]
Myrian deMoura Abdon Jan. 1983 118 p refs In PORTUGUESE; ENGLISH summary Original contains color illustrations
(INPE-2627-TDL/110) Avail: NTIS HC A06/MF A01

The delimitation of favorable zones for the fishing of three species (Thunnus albacares, Thunnus alalunga and Thunnus obesus) utilizing oceanographic data and SMS-2 satellite data was studied. The oceanographic and fishery data were worked by monthly mean and by 25 sq deg. Correlations between oceanographic data of surface temperature and fish catch data were made. Surface temperature intervals corresponding to larger fish catch for each species were determined. After that, these intervals were transformed into data corresponding to that registered by the SMS-2 satellite through regression lines constructed with coastal stations (fixed) data and SMS-2 data. These intervals were located in the satellite images and related to the water masses present in the study area. The results showed that temperature cannot be considered by itself as the only indicator of the presence of tuna in specified regions. It is necessary to work with more precise sea surface temperature data, collected in real time, in order to relate to oceanographic and environmental conditions at greater depths, where the studied tuna species are found. S.L.

N83-22942# Washington Univ., Seattle. Dept. of Oceanography.
VERTICAL SECTIONS OF TEMPERATURE, SALINITY, THERMOSTERIC ANOMALY AND ZONAL GEOSTROPHIC VELOCITY FROM NORPAX SHUTTLE EXPERIMENT, PART 2
Bruce A. Taft, Paavo Kovala, and Alan Cantos-Figuerola Seattle NOAA May 1982 100 p refs
(PB83-115741; NOAA-DR-ERL-PMEL-5; NOAA-82081902) Avail: NTIS HC A05/MF A01 CSCL 08J

The NORPAX Hawaii-Tahiti Shuttle Experiment was carried out in the central Pacific during the period February 1979 to June 1980. Profiling data from legs 6 to 10 of the Shuttle (July 1979-January 1980) were covered. Vertical sections of temperature, salinity, thermosteric anomaly and zonal geostrophic velocity are presented. Meridional profiles of surface temperature, surface salinity, surface thermosteric anomaly and geostrophic volume transport relative to 1000 db are included. Author (GRA)

N83-22943# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A TECHNIQUE FOR DETERMINING THE LOCATION AND FLOW ALONG THE AXIS OF THE FLORIDA CURRENT
R. S. Lyons, D. E. Barrick, and A. S. Frisch Sep. 1982 30 p refs
(PB83-117713; NOAA-TM-ERL-WPL-100) Avail: NTIS HC A03/MF A01 CSCL 08C

A technique to obtain the surface location of the axis and flow around the axis of the Florida Current is described, and the results are compared with CODAR current vector maps. The technique requires radial surface velocities from only a one site HF radar like a CODAR. Over the sea along each radial line extending outward from the site, the radial current velocities are least squares fit to a quadratic polynominal. The maximum velocity and location of that velocity from the radar site for each azimuthal angle over the ocean is estimated from the polynomial coefficients. The location of the Florida Current axis is determined by a cubic polynominal fit to the maximum velocity positions along each radial. GRA

N83-22944# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.
CURRENT METER DATA PROCESSING AND QUALITY CONTROL METHODS
Donald A. Ortman Jan. 1982 26 p refs
(PB83-118505; NOAA-TM-OMPA-14; NOAA-82082403) Avail: NTIS HC A03/MF A01 CSCL 08C

Fixed point current meter data processing is described from the initial data acquisition to the final data product. Much of the early discussion is unique to the series of Aanderaa recording instruments although the techniques of editing and joining of time series are generally applicable to any velocity time series. The stages of data processing are: conversion of instrument units to scientific units; editing strategies; and joining and filtering strategies. GRA

N83-22945# Science Applications, Inc., Raleigh, N.C.
ANALYSIS OF CURRENT METER RECORDS AT NORTHWEST ATLANTIC 2800 METRE RADIOACTIVE WASTE DUMPSITE Final Report
Peter Hamilton 17 Jun. 1982 101 p refs
(Contract EPA-68-01-6235)
(PB83-117614; EPA-520/1-82-002) Avail: NTIS HC A06/MF A01 CSCL 08C

In August, 1976, four current meter arrays were deployed for a period of three months at the Atlantic 2800 meter radioactive waste disposal site as part of a scientific survey by the U.S. Environmental Protection Agency to assess the environmental conditions at this formerly used site. The disposal site is located on the Continental Rise and is centered at 38 deg 30' N, 72 deg 06' W. The four arrays were placed in a rectangle near the periphery of the site, each with a current meter 5.1 meters off the bottom, with an additional meter located 95 meters from the bottom at the southwest mooring. The principal findings included a 3-4 cm/s southwesterly mean current observed near the bottom. The low frequency part of the spectrum is explained as bottom trapped topographic Rossby waves. The high frequency motions are dominated by inertial oscillations with a maximum amplitude of about 10 cm/s. Author (GRA)

N83-22946# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.
OFFICE OF MARINE POLLUTION ASSESSMENT TECHNICAL PLAN FOR FISCAL YEAR 1983
Jul. 1982 183 p ref
(PB83-116749; NOAA-82101102) Avail: NTIS HC A09/MF A01 CSCL 08J

Research activities of the office of marine pollution assessment (OMPA). Areas covered include the following: marine waste dispsoal, marine mining, marine energy, marine transportation, accidental discharges, and coastal land use. GRA

N83-22947# Virginia Inst. of Marine Science, Gloucester Point.
EXAMINATION OF TIDAL FLATS. VOLUME 1: RESEARCH REPORT Final Report, Sep. 1977 - Sep. 1981
R. J. Diaz, ed., G. Markwith, R. J. Orth, W. Rizzo, and R. Wetzel Washington Federal Highway Administration Jun. 1982 86 p refs 3 Vol.
(Contract DOT-FH-11-9360)
(PB83-131789; SRAMSOE-255-Vol-1; FHWA/RD-80/181-Vol-1) Avail: NTIS HC A05/MF A01; also available in set of 3 reports HC E99 as PB83-131771 CSCL 08F

Data collected on the biological processes and communities of tidal flats are summarized. From analyzing these and other data on tidal flats it appears that attempts to establish guidelines for evaluation need to include the type of habitat (grass bed, sand or mud flat), season, and geographic location. These are most important for animal communities. GRA

N83-22948# Virginia Inst. of Marine Science, Gloucester Point.
EXAMINATION OF TIDAL FLATS. VOLUME 2: IDENTIFIED VALUES REVIEW Final Report, Sep. 1977 - Nov. 1980
R. J. Diaz, ed., R. J. Orth, G. Markwith, W. Rizzo, R. Wetzel, and

K. Storey Washington Federal Highway Administration Jun. 1982 51 p refs 3 Vol.
(Contract DOT-FH-11-9360)
(PB83-131797; SRAMSOE-245-Vol-2; FHWA/RD-80/182-Vol-2)
Avail: NTIS HC A04/MF A01; also available in set of 3 reports HC E99 as PB83-131771 CSCL 08F

The available information from the literature concerning physical, chemical, and biological processes characteristic of the tidal flat environment is summarized. Possible techniques for the evaluation of coastal wetland types for management or scientific purposes are suggested. Information is of use in highway project planning. GRA

N83-22949# Virginia Inst. of Marine Science, Gloucester Point.
EXAMINATION OF TIDAL FLATS. VOLUME 3: EVALUATION METHODOLOGY Final Report, Sep. 1977 - Sep. 1981
R. J. Diaz Washington Federal Highway Administration Jun. 1982 58 p refs 3 Vol.
(Contract DOT-FH-11-9360)
(PB83-131805; SRAMSOE-256-Vol-3; FHWA/RD-80/183-Vol-3)
Avail: NTIS HC A04/MF A01; also available in set of 3 reports HC E99 as PB83-131771 CSCL 08F

An approach to the evaluation of tidal flats is given which centers around state-of-the-art knowledge for assessing the values of tidal flats and establishing the basis for comparison of specific sites. Parameters identified as important for evaluation of tidal flat value fall into two categories; primary producers (chlorophyll a concentration and light intensity) and support populations (annelid, mollusc, and crustacean biomass and abundance). The information is of use in highway project planning. GRA

N83-22681# Joint Publications Research Service, Arlington, Va.
RESULTS AND PROSPECTS OF COOPERATIVE OCEANOLOGICAL RESEARCH
Andrey Aksenov *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 12-16 Transl. into ENGLISH from Ekon. Sotrudnichestvo Stran-Chlenov Sev (USSR), no. 7, Jul. 1982 p 6-10 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

N83-22682# Joint Publications Research Service, Arlington, Va.
SYSTEM FOR MARINE GEOPHYSICAL SURVEY
V. Ilichev and A. Yanshin *In its* USSR Rept.: Earth Sci., No. 24 (JPRS-82772) 1 Feb. 1983 p 17-19 Transl. into ENGLISH from Pravda (Moscow), 2 Oct. 1982 p 2 (For primary document see N83-22680 12-42)
Avail: NTIS HC A04

N83-22973# Joint Publications Research Service, Arlington, Va.
SOME PATTERNS OF DISTRIBUTION OF POLLUTANTS IN SEAPORT WATERS
V. A. Kolodenko, Yu. I. Gutsel, and N. N. Nadvornyy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 66-69 refs Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 66-69 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

N83-22669# Hokkaido Univ., Sapporo (Japan).
COLD WATER MASSES APPEARED IN THE OKHOTSK SEA NEAR HOKKAIDO IN SUMMER
Tatsuo Motoi, Nobuo Ono, and Masaaki Aota *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 199-206 refs (For primary document see N83-22648 12-70)
Avail: NTIS HC A11/MF A01

N83-22670# Hokkaido Univ., Sapporo (Japan).
ON OCEANIC STRUCTURE OF A FRONTAL REGION OF SOYA WARM CURRENT, PRELIMINARY REPORT
Masaaki Aota *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 207-215 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N83-22950# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
LIGNIN OF THE LOWER PLANTS. 4: ISOLATION AND INVESTIGATION OF THE LIGNIN OF ALGAE
V. M. Reznikov and M. F. Mikhaseva 1983 8 p refs Transl. into ENGLISH from Khim. Drevesniy (USSR), v. 4, 1976 p 76-79 (NRC/CNR-TT-2054; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

G.L. Stadnikov has obtained nonhydrolyzable substances from the algae Laminaria digitata, L. japonica and Fucus vesiculosus in the amounts 7, 10 and 19% with carbon contents of 53, 62 and 61% respectively and very low methoxyl content. By analysis of these results and of a series of other works, it is concluded that lignin enters into the plant substance at all stages in the evolutionary tree up to unicellular algae, during which its contents increased so far as to serve in the organization of the plant. L.F.M.

N83-22951# Argonne National Lab., Ill. Div. of Biological and Medical Research.
BIOLOGICAL AND MEDICAL RESEARCH: LOW LEVEL RADIATION, CARCINOGENESIS, TOXICOLOGY, HUMAN PROTEIN INDEX, BIOPHYSICS Annual Technical Report
Marcia W. Rosenthal, ed. Jun. 1982 160 p refs Sponsored by DOE
(DE83-000920; ANL-82-35) Avail: NTIS HC A08/MF A01

Biological and medical research performed during 1981 is summarized. The studies included work in: low level radiation; carcinogensis; toxicology; human protein index; and biophysics. Reports on support facilities, educational activities, seminars, staff talks, and funding agencies are included. For individual titles, see N83-22952 through N83-22965.

N83-22952# Argonne National Lab., Ill.
NEUTRON AND GAMMA RAY TOXICITY STUDIES c52
J. F. Thomson, D. Grahn, L. S. Lombard, F. S. Williamson, K. H. Allen, G. L. Holmblad, J. L. Hulesch, V. A. Ludeman, A. R. Sallese, E. F. Staffeldt et al *In* ANL Biol. and Med. Res. Jun. 1982 p 7-9 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The late effects of low doses of high-LET and low-LET ionizing radiation in rodents, to predict radiation hazards to man, was investigated. The data aid in the construction of dose response curves for somatic effects, for single and fractionated exposures to both high-LET and low-LET radiation. E.A.K.

N83-22953# Argonne National Lab., Ill.
RADIATION TOXICITY IN DOGS
T. E. Fritz, L. S. Lombard, C. M. Poole, T. M. Seed, D. V. Tolle, J. M. Angerman, S. M. Cullen, D. Doyle, L. V. Kaspar, W. G. Keenan et al *In* ANL Biol. and Med. Res. Jun. 1982 p 11-13 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

Late effects of low doses of ionizing radiation, in large, long living animals were investigated. The influence of daily exposure rate and accumulated total exposure are determined. Radiation specific excess mortality in the dog is compared with rodents to develop a unifying concept of damage. Base line data and specimens which characterize the pathogenesis and mechanisms of induction of leukemia, aplastic anemia, and late occurring soft tissue tumors are provided. E.A.K.

N83-22954# Argonne National Lab., Ill.
RADIATION-INDUCED HEMOPATHOLOGIES c52
T. M. Seed and L. V. Kaspar *In* ANL Biol. and Med. Res. Jun. 1982 p 15-17 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The early cellular events which take place in the initial stages of aplastic anemia and leukemia were characterized. The nature of pathological progression in aplastic anemia and myeloid leukemia

in beagles who are continuously exposed to low daily doses of gamma irradiation is defined. Cellular mechanisms of hematopoietic accommodation under chronic low dose irradiation, and the relationship between the accommodation and the induction and the development of the major hemapathological end points are outlined. E.A.K.

N83-22955# Argonne National Lab., Ill.
RADIATION BIOLOGY OF CULTURED MAMMALIAN CELLS
A. Han, M. M. Elkind (Colorado State Univ.), E. Ben-Hur (Nuclear Research Center-Negev), F. Buonaguro, C. K. Hill, H. Utsumi (Kyoto Univ.), F. Suzuki, E. M. Buess, J. L. Dainko, P. J. Dale et al *In* ANL Biol. and Med. Res. Jun. 1982 p 19-22 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The mechanisms of radiation induced changes in mammalian cells which lead to cell lethality, mutation, and neoplastic transformation were examined. The influence of repair processes are investigated. Different qualities of ionizing radiations and nonionizing radiations of different wavelengths are used. E.A.K.

N83-22956# Argonne National Lab., Ill.
MAMMALIAN GENETICS
D. Grahn, N. L. Garriott, B. H. Farrington, C. H. Lee, J. J. Russell, and D. J. Crowe *In* ANL Biol. and Med. Res. Jun. 1982 p 23-25 (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The genetic hazards from testicular borders of 239Pu and the retention and microdistribution of this element in the testis were determined. The effects of 239Pu with single, weekly and continuous 60 Co gamma irradiation and single and weekly fission neutron irradiation are compared to develop a basis for estimating relative biological effectiveness (RBE) for genetic end points. Dose response data for genetic end points, at low doses of neutron and gamma rays are developed. E.A.K.

N83-22957# Argonne National Lab., Ill.
MOLECULAR AND CELLULAR EFFECTS OF SOLAR ULTRAVIOLET LIGHT **c52**
M. J. Peak, J. G. Peak, R. W. Tuveson (Illinois Univ.), M. A. Turner (Missouri Univ.), and L. A. Nerad (Illinois Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 41-44 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The basic nature and mechanism of lethality, mutagenesis and transformation caused by environmentally important nonionizing solar radiation which is present in the ecosystem was addressed. The possibility of enhanced fluxes of UVB from attenuation of stratospheric ozone due to release of halocarbons is emphasized. Th DNA damages which lead to lethal and mutagenic effects, and the occurrence of natural and experimental added molecular probes in the mechanisms of these events are outlined. E.A.K.

N83-22958# Argonne National Lab., Ill.
METAL METABOLISM AND TOXICITY **c52**
M. H. Bhattacharyya, R. P. Larsen, P. A. Benioff, H. C. Furr (Illinois Benedictine College), E. S. Moretti, R. D. Oldham, D. P. Peterson, M. I. Spaletto, and M. E. Shackelford (Illinois Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 51-53 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The metabolism and toxicity of metal compounds in animals and man were examined. Metal compounds which are related to specific energy technologies, and exposure conditions related to human exposure were studied. Three areas are identified: (1) metabolism and toxicity of nonnuclear toxic metals; (2) gastronintestinal absorption of actinide elements; and (3) assessment of health and environment effects of battery energy storage technologies. E.A.K.

N83-22959# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION **c52**
C. A. Reilly, Jr., F. R. Kirchner, T. Matsushita, M. J. Peak, K. E. Wilzbach, R. E. Jones, J. M. Leonardo, G. Kaufman, K. T. Blankenship (Chatham College), and R. M. Bressette (St. Benedict College) *In* ANL Biol. and Med. Res. Jun. 1982 p 59-63 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

Toxicants present in coal conversion process streams and effluents and their impact on human health and environment were investigated. Information is provided on toxicological screening in coal gasification effluents. The organic by products of coal gasification are emphasized. The materials from the following three gasifiers were studied: fluidized beds, slagging fixed bed and coal pyrolysis. E.A.K.

N83-22960# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION: CHEMICAL CHARACTERIZATION **c52**
D. A. Haugen, M. J. Peak, V. C. Stamoudis, A. S. Boparai, C. A. Reilly, Jr., K. E. Wilzbach, K. M. Suhrbier, S. S. Dornfeld, D. Venters, and F. J. Tremmel (Iowa Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 65-68 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The organic chemicals which are primarily responsible for the toxicological activity of synfuel materials, their mode of action and biological fate and their toxic activity when present in complex mixtures were investigated. The long range objectives are to provide information which is useful to: (1) establish chemical analysis and bioassays to predict toxic effects; and (2) direct possible alterations of process and cleanup conditions to decrease the potential for adverse health effects. E.A.K.

N83-22961# Argonne National Lab., Ill.
NEUROBEHAVIORAL CHRONOBIOLOGY AND TOXICOLOGY **c52**
C. F. Ehret, A. L. Cahill, R. S. Rosenberg, P. H. Duffy, K. R. Groh, J. J. Russell, J. V. Barnett (Indiana State Univ.), A. S. Gulczynski (Northeastern Illinois College), R. Scott (Cheyney State College), and G. H. Thomsen (Tampa Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 69-72 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

Neurotoxic damage caused by energy related agents and conditions was measured. Changes in established biological rhythms are studied and investigations on physiological, neurochemical and behavioral effects are included. E.A.K.

N83-22962# Argonne National Lab., Ill.
BIOSTATISTICS AND HEALTH IMPACTS OF ENERGY TECHNOLOGIES **c52**
M. E. Ginevan, B. A. Carnes, J. J. Collins, C. D. Brown, J. R. B. Curtiss, N. Devine, and A. Rock (Michigan Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 73-76 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

Statistical methodology and mathematical models relevant to the assessment of health impacts of energy technologies were developed. Efforts include: (1) development of a statistical procedure for reducing dimensionality in studies of disease environment association; (2) development of maximum eigenvalue least squares (MELS) theory for identifying, quantifying, and circumventing collinearity in regression models; (3) evaluation of statistical model violations in an analysis of covariance study of air pollution; and (4) development of an age period cohort model of breast cancer. E.A.K.

N83-22963# Argonne National Lab., Ill.
THE HUMAN PROTEIN INDEX **c52**
N. G. Anderson, N. L. Anderson, J. J. Edwards, C. S. Giometti, J. Taylor, K. E. Willard, M. A. Gemmell, S. L. Nance, A. E. Scandora (Science Applications, Inc.), and S. L. Tollaksen (Tougaloo College) *In* ANL Biol. and Med. Res. Jun. 1982 p 79-83 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The use of dimensional electrophoresis to establish an annotated index of human proteins which will include data on normal proteins, genetic variations, and disease related changes is outlined. The establishment of such a human protein index required the development of methods for running large numbers of analyses in a reproductible manner, the development of computerized image analysis and data base systems, and the production of protein maps of major body fluids and accessible cells and tissues. E.A.K.

N83-22964# Argonne National Lab., Ill.
PROPERTIES OF BIOLOGICAL MOLECULES IN SOLUTION
M. MacCoss, H. M. Schwartz, C. F. Ainsworth, S. H. Gray (Illinois Univ.), M. McCroskey (Maryville College), and R. J. Ross (Northern Illinois Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 87-89 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

Biological molecules and their properties in solution were investigated. The purpose is to study: (1) the synthesis end chemical characterization of naturally occurring biomolecules and specifically modified analogues; (2) determination of quantitative structural/conformational parameters for those molecules; and (3) correlation of structural and conformational properties with biological functions. E.A.K.

N83-22965# Argonne National Lab., Ill.
NEUTRON AND X-RAY SMALL-ANGLE SCATTERING c72
C. S. Borso, B. I. Berkoff (Princeton Univ.), and C. T. Mizumoto (Pacific Union College) *In* ANL Biol. and Med. Res. Jun. 1982 p 95-97 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

The development of unique X-ray and neutron small angle scattering facilities and to study the structure and dynamics of individual biological molecules and complexes of interacting macromolecules is discussed. New instrumentation to provide biophysical techniques for structural investigations of important biological molecules, with emphasis on calcium dependent proteins involved in cellular regulations is developed. Time of flight diffractions techniques are developed to utilize resonance small angle scattering at spallation pulsed neutron sources, and novel detector technology is employed to increase the temporal resolution available from high intensity synchrotron sources to study the structural dynamics of proteins. E.A.K.

N83-22966# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 1: N, N-DIMETHYLMYRISTAMIDE
G. R. Seely, A. M. Rutkoski, Y. Kusumoto, V. Senthilathipan, and E. R. Shaw 1982 32 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000349; DOE/ER-12039/T2-Pt-1) Avail: NTIS HC A03/MF A01

Model systems have been prepared in which chlorophyll a and N,N-dimenthylmyristamide (DMMA) are adsorbed together in various ratios to particles of polyethylene swollen with undecane. The adsorption is performed by equilibrating the particles with methanol-water solutions of increasing water content. Absorption spectra of the coated particles in viscous suspensions show sharp well-marked bands over much of the composition range examined. With the aid of second derivative spectra, the red absorption band has been resolved into three components, at 661.5, 674 and 689 nm. Fluorescence spectra have also been resolved into their principal components with some assistance from comparison with spectra of chlorophyll in undecane solution containing DMMA. At room temperature (295 K) the resolvable components are of monomeric chlorophyll at 670 nm, and of associated species at 681 and 725 nm. Fluorescence at 77 K is of similar intensity but is distributed differently in favor of longer-wave components. Corresponding to the 295 K components are emission bands at 675, 683-5 and 735 nm. Other components appear under certain conditions: at 695 to 700 nm when the chlorophyll and DMMA concentrations are both high, and at 705 nm when the ratio of DMMA to chlorophyll is low. DOE

N83-22967# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 2. THE ISOMERIC N-(PYRIDYL)MYRISTAMIDES
Y. Kusumoto, G. R. Seely, and V. Senthilathipan 1982 36 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000348; DOE/ER-12039/T2-Pt-2) Avail: NTIS HC A03/MF A01

When chlorophyll, together with certain other amphiphilic substances, is adsorbed to particles of polyethylene plasticized by incorporation of tetradecane, it is maintained: in monomeric or oligomeric forms with characteristic absorption and fluorescence spectra. The properties of chlorophyll a on such particles in the presence of the three isomeric N-(pyridyl)myristamides is described, and of the similarly shaped but not basic compound myristanilide, in an effort to ascertain the structural factors governing associations of these species. Absorption and fluorescence spectra at room temperature are resolved into minimal sets of Gaussian components, and relations between the component sets are proposed. The positions of the component bands and their relative abundance are characteristic of the amide used. The 3 and 4 pyridyl isomers bind more strongly to chlorophyll, probably by ligation of the pyridine nitrogen to Mg of the pigment. The 2 pyridyl isomer and myristanilide bind more weakly, probably through the amide carbonyl group. DOE

N83-22968# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 3: UNUSUAL SPECTRA OF CHLOROPHYLL a WITH N-METHYLMYRISTAMIDE
Y. Kusumoto, V. Senthilathipan, and G. R. Seely 1982 20 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000533; DOE/ER-12039/T2-Pt-3) Avail: NTIS HC A02/MF A01

The absorption spectrum of chlorophyll a, adsorbed with the amphiphilic amide, N-methylmyristamide, to particles of polyethylene swollen with tetradecane, is unusual in that the red band apparently consists of three main components, which by Gaussian deconvolution are located at 664.5, 678 and 687 nm. The last is very narrow, with a bandwidth of only 5 to 6 nm at half maximum. At low amide concentration, the 744 nm band of chlorophyll hydrate is also observed. Room temperature fluorescence is weak, and indistinctly resolved into bands. However, on gradual cooling to 80 K, the fluorescence intensifies greatly; the spectrum can be resolved into at least eight bands, some of which can be related to room temperature absorption bands with some reliability. The circular dichroism spectrum of the red band region shows optical rotatory strength in two narrow bands at 677 and 686 nm which is enormous, compared to that of monomeric chlorophyll or even the 744 nm hydrate. It is suggested that cyclic oligomer structures, in which adjacent chlorophylls are linked through the amide group of NMMA, might be responsible for the spectral phenomena. DOE

N83-22969# Boston Univ., Mass. Dept. of Chemistry.
INVESTIGATION OF THE TRIPLET STATE OF CHLOROPHYLLS Progress Report, 1 May 1981 - 30 Apr. 1983
Richard H. Clarke 25 Nov. 1982 12 p
(Contract DE-AC02-76ER-02570)
(DE83-003747; DOE/ER-02570/9; COO-2570-9) Avail: NTIS HC A02/MF A01

The triplet state of chlorophyll was utilized as a (nondestructive) probe into the structural and dynamical nature of the photosynthetic unit. Using primarily zero field optically detected magnetic resonance spectroscopy, supplemented by resonance raman spectroscopy, we have examined the chlorophyll molecule in a range of environments in both in vivo systems and in model chlorophyll

units in vitro. Our research effort has focused on chlorophyll in the presence of simple organic ligands, in lipid bilayer vesicles, in synthetically reconstituted protein, and on the surface of metal and nonmetal substrates. The overall aim of the research has been to detail the physical features and interactions of the photosynthetic pigment systems through examination of pigment subunits of the photosynthetic apparatus and model system which represent them. DOE

N83-22970# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 28
21 Jan. 1983 111 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82696) Avail: NTIS HC A06

Articles and abstracts are presented covering the fields of biochemistry, biotechnology, environment pollution, epidemiology, genetics, public health, radiation biology, laser applications, and human factors engineering. For individual titles, see N83-22971 through N83-22978.

N83-22971# Joint Publications Research Service, Arlington, Va.
UPDATE ON INDUSTRIAL MICROBIOLOGY
P. Solozhenkin *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 9-12 Transl. into ENGLISH from Kommunist Tadzhikistana (USSR), 1 Sep. 1982 p 2 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

The use of microbiological products and preparations in nonferrous metallurgy, chemical and textile industries, and agriculture is discussed. The conversion of agricultural wastes to edible protein and toxic waste conversion by bacterial agents are also addressed. M.G.

N83-22972# Joint Publications Research Service, Arlington, Va.
USE OF GEOCHEMICAL INVESTIGATIVE METHODS FOR PRELIMINARY HYGIENIC ASSESSMENT OF EFFECT OF AIRPORTS ON ENVIRONMENT **c09**
V. M. Kotlyar, L. N. Pavlova, and R. S. Smirnova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 13-16 Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 63-65 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

Geochemical methods were used to identify chemical pollutants specific to airports and to measure the range of influence of airports as a source of pollution. High concentrations of 19 pollutants were found in soil and the localization of the zones of most intensive pollution was found to be related to the sites of prolonged or forced operation of aircraft engines. Atmospheric and hydrologic routes of pollution transport also correlated with soil concentration results. Pollution absorption by plants is also addressed. M.G.

N83-22973# Joint Publications Research Service, Arlington, Va.
SOME PATTERNS OF DISTRIBUTION OF POLLUTANTS IN SEAPORT WATERS **c48**
V. A. Kolodenko, Yu. I. Gutsel, and N. N. Nadvornyy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 66-69 refs Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 66-69 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

The main patterns of distribution of pollutants in seaport waters were investigated under different meteorologial conditions and the optimum sites for laboratory monitoring of the changing sanitary state of sea water were determined. Results indicate that hydraulic installations lead to change in horizontal stratification and create conditions for accumulation of pollutants in the upper layers of water. Because of intensive mixing processes at the mooring line during water rises, the distribution in depth of organic matter, surfactants, and petroleum products is more uniform than in other parts of the port. M.G.

N83-22974# Joint Publications Research Service, Arlington, Va.
COMPARATIVE MUTAGENIC EFFECTIVENESS OF GAMMA AND LASER RADIATION
V. G. Volodin, V. A. Mostovnikov, B. I. Avramenko, Z. I. Lisovskaya, and I. V. Khokhlov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 29-32 Transl. into ENGLISH from Dokl. Akad. Nauk BSSR (Minsk), v. 26, no. 8, Aug. 1982 p 753-756 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

The mutagenic effectiveness of gamma and laser radiation was investigated using cultivars and mutants of spring wheat and barley. M.G.

N83-22975# Joint Publications Research Service, Arlington, Va.
USE OF LASERS IN HYGIENIC STUDIES **c52**
V. A. Kashuba and M. A. Matyashova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 36-40 refs Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 55-58 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

Methods of monitoring and assessing tho degree of pollution of the environment using various types of lasers are reviewed. Air, water, and soil pollution are addressed. M.G.

N83-22976# Joint Publications Research Service, Arlington, Va.
EVALUATION OF SIGNIFICANCE OF PARAMETERS OF FUNCTIONAL ACTIVITY OF ADRENAL CORTEX TO FORECASTING INDIVIDUAL RADIOSENSITIVITY. REPORT 1: METHODOLOGICAL APPROACHES TO FORECASTING INDIVIDUAL RADIOSENSITIVITY ACCORDING TO INDIRECT PARAMETER OF ADRENOCORTICAL ACTIVITY
In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 50-54 refs Transl. into ENGLISH from Radiobiologiya (Moscow), v. 21, no. 1, Jan. - Feb. 1981 p 86-89 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

Male Wistar rats weighing 227 + or - 6.4 g were used to investigate the possibility of predicting the outcome of radiation sickness on the basis of derivative parameters of K/Na ratio in whole blood before and after irradiation by the method of parabolic distribution and Gaussian type distribution. It was shown that use of Gaussian type distribution permitted forecasting the outcome of radiation sickness according to K/Na parameters in blood, with maximum accuracy of 89%. M.G.

N83-22977# Joint Publications Research Service, Arlington, Va.
PRESSING PROBLEMS OF RADIOECOLOGY IN LIGHT OF SOLVING ATOMIC ENERGY PROBLEMS **c45**
R. M. Aleksakhin and G. G. Polikarpov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., no. 28 (JPRS-82696) 21 Jan. 1983 p 55-68 refs Transl. into ENGLISH from Radiobiologiya (Moscow), v. 21, no. 1, Jan. - Feb. 1981 p 97-108 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

The main tasks are outlined for modern radioecology in the area of migration of natural and artificial radionuclides, effects of ionizing radiation on natural biogeocenoses in connection with development of atomic energy. There is discussion of problems of setting ecological standards for radiation effects on ecosystems, and a classification is offered for natural zones according to criterion of radioecological condition. Emphasis is laid on the importance of studies of migration into the biosphere of radionuclides of the complete nuclear fuel turnover. Author

N83-22978# Joint Publications Research Service, Arlington, Va.
HUMAN FACTOR IN CONTROL SYSTEMS **c54**
Georgiy Lvovich Smolyan and Kim Vasilyevich Tobolev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 69-107 refs Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhn.: Ser. Mat., Kibernetika (Moscow), no. 9, Sep. 1974 p 1-62 (For primary document see

N83-22970 12-51)
Avail: NTIS HC A06/MF A01

Functional distinctions of the human element in automated control systems are defined and discussed. Operator training by means of so-called algorithmic model of a control system and evaluation of efficiency of automated systems are also addressed. M.G.

N83-22979 Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 29
3 Mar. 1983 96 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82998) Copyright. Avail: NTIS HC A05/MF A01

Several areas of biomedical and behavioral sciences were addressed including human factors, radiation biology, public health, microbiology, and genetic engineering. For individual titles, see N83-22980 through N83-22987.

N83-22980# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CHANGES IN CELL MEMBRANES OF CHINESE HAMSTER FIBROBLASTS USING FLUORESCENT PROBE AFTER EXPOSURE TO LASER AND X-RADIATION
A. K. Abdvakhitova, I. M. Parkhomenko, and T. N. Sokolova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 37-42 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 155-159 Original language document was announced as A82-35660 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

A study was made of interaction between a fluorescent probe 1-anilinonaphthalene-8-sulfonate and Chinese hamster cells exposed to a helium neon laser in stimulating doses. A decrease in fluorescence was demonstrated in the probe bound with irradiated cells; the binding constant (K sub b) decreased 1.7 to 1.8 fold while quantum yield decreased to 1/2 to 1/3. The quantum yield decreased to 1/2 to 1/3 and K sub b increased 1.5 to 1.7 fold after x-irradiation in a dosage of 8 Gy. Author

N83-22981# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF RADIOPROTECTIVE EFFECT OF CYSTEAMINE ON MODEL OF HEAT-INDUCED PROPHAGE LAMBDA
S. Ye. Bresler, V. L. Kalinin, and I. N. Suslova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 43-50 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 176-182 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

Studies were made of lethal and mutagenic effects of Co(60) gamma quanta on prophage lambda c1857 in lysogenic cells of Eschrichia coli AB1886 uvrA6 and AB2463 recA13 irradiated in the absence or presence of cysteamine (0.05 M). With heat induction immediately after gamma radiation, cysteamine sensitizes prophage to the lethal effect of gamma quanta (DMF (dose modification factor) nearly equal to 1.5). In the presence of cysteamine, the frequency of gamma induced c mutations is much higher in prophage than in the absence of cysteamine, in lysogen AB1886, but not lysogen AB2463. With induction of prophage after postradiation incubation in broth, neither survival nor incidence of gamma induced mutations depend on presence of cysteamine at the time of irradiation or on the product of the recA(+) gene. Author

N83-22982# Joint Publications Research Service, Arlington, Va.
COMPARATIVE EVALUATION OF EFFICACY OF RADIOPROTECTIVE AGENTS ACCORDING TO CRITERIA OF BONE MARROW AND GASTROINTESTINAL TRACT PROTECTION
N. N. Pyatovskaya and I. Ye. Brumberg *In its* USSR: Rept.: Life Sci. Biomed. and Behavioral refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 183-186 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

In experiments on mice, it was demonstrated that the radioprotective agent, 4-aminobenzo-2,1,3-thiadiazol, unlike cystamine, protects hemopoietic tissue against ionizing radiation and has no radioprotective effect on the gastrointestinal tract. The effect of this agent is manifested in bone marrow on the level of stem cells and does not affect cells in the proliferative and maturing pool. Author

N83-22983# Joint Publications Research Service, Arlington, Va.
EFFECT OF SOME PHARMACOLOGICALLY ACTIVE SUBSTANCES ON CYSTAMINE TRANSFORMATION IN MOUSE TISSUES c52
L. G. Tarnopolskaya *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 56-60 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 246-249 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

It is known that sulfur containing radioprotective agents, in particular, cystamine, are subject to rather rapid transformation in the body, and intensity of metabolism of the agent increases as its dosage decreases. This circumstance is largely the reason for administering the protective compound in doses that are close to the maximum tolerated level in order to create and maintain a high level of the active form, with respect to radioprotection, of this agent in tissues by the time of exposure to radiation. However, it is very probable that accumulation of the required amount of cystamine for protection could also be obtained with smaller than optimum radioprotective doses, if there is slower conversion of the radioprotective agent. Since cystamine metabolism is closely related to oxidative processes in tissues, it was assumed that its combined use with pharmacologically active agents capable of altering the level of metabolic processes in the organism would lead to a change in rate of breakdown of the sulfur containing radioprotector. Author

N83-22984# Joint Publications Research Service, Arlington, Va.
PROTECTIVE EFFECT OF HYPOXIC GAS MIXTURE ON COMBINED EXPOSURE TO RADIATION AND PHYSICAL LOAD c52
A. I. Britun, R. B. Strelkov, N. G. Kucherenko, and O. I. Kurochkina *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 61-64 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 250-252 Original language document was announced as A82-35653 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

Breathing a hypoxic gas mixture containing 10% oxygen and 90% nitrogen (HGM-10) enhances radioresistance of different animal species. The radioprotective effect of HGM-10 in the presence of a physical load was investigated. Knowledge about the oxygen effect enabled us to broaden use of HGM-10 for practical purposes. Author

N83-22985# Joint Publications Research Service, Arlington, Va.
ROLE OF ENDOGENOUS SUBSTANCES IN ENHANCING RADIORESISTANCE BACKGROUND. INVESTIGATION OF EFFECTS OF SOME AET DERIVATIVES ON ENDOGENOUS RADIORESISTANCE BACKGROUND
Ye. N. Goncharenko, S. V. Stoyev, S. V. Antonova, and Ye. E. Grayevskaya *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 65-68 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 252-255 (For primary document see N83-22979 12-51) (Rept-16) Avail: NTIS HC A05

Data were published in 1974 concerning the radioprotective effect of adeturon [S-2-aminoethyl isothiuronium adenosine triphosphate], a product synthesized with use of two compounds, ATP and AET [aminoethylisothiuronium]. Two more products were developed in the same laboratory, based on AET: 2-amino-4-iminothiazoline (DAT) and bromoethylisothiourea (BET). Adeturon and DAT demonstrated good radio-protective properties in mammals, and this served as grounds for intensive investigation of the mechanism of their action. Radioprotective agents were

described from the standpoint of endogenous radioresistance background. Author

N83-22986# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF GENERAL ADAPTABILITY OF OFFSPRING OF IRRADIATED ANIMALS. MOUSE RESISTANCE TO RADIATION, HYPOXIA, ENDOTOXIN AND PHYSICAL EXERCISE
I. Ye. Vorobtsova and K. L. Golzberg *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 69-72 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 261-264 (For primary document see N83-22979 12-51)
(Rept-3) Copyright. Avail: NTIS HC A05

Analysis of the literature dealing with distinctive features of offspring of biological objects indicates that the information on this score is contradictory and insufficient. At the same time, the importance of such studies is obvious, since evaluation of genetic sequelae of ionizing radiation is considered full enough only if it is based not only on data concerning the speed of the mutation process, as determined by appearance of major genetic abnormalities in generations of an irradiated population, but the results of studying the offspring of irradiated organisms with reference to the most diverse quantitative criteria characterizing general fitness of these specimens (life expectance, resistance to deleterious agents, etc.). Author

N83-22987# Joint Publications Research Service, Arlington, Va.
RADIOPROTECTIVE AND TOXICOLOGICAL PROPERTIES OF PHENYLETHYLAMINE DERIVATIVES MODIFIED WITH ALPHA AMINO ACIDS **c52**
T. Yu. Ilyuchenok, K. S. Shadurskiy, S. V. Rogozhin, V. G. Yashunskiy, L. M. Frigidova, V. I. butayeva, and Yu. A. Davidovich *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 73-79 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 269-275 (For primary document see N83-22979 12-51)
Avail: NTIS HC A05

Radioprotective agents among derivatives of alpha and beta-phenylethylamine were sought. A continuation of this search resulted in synthesis of 27 chemical compounds modified by alpha amino acids. In recent years, it was demonstrated that some amino acids have marked radioprotective activity. They were used extensively to correct some of the undesirable properties (reduce irritating and ulcer producing activity, lower toxicity, improve solubility, etc.), as well as to enhance the efficacy of drugs. Results of investigation of toxicity and radioprotective properties of alpha amino acid derivatives of beta phenylethylamine, which differ from one another in substituent in the para position of the benzene ring are presented. Author

N83-22988 Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 20
11 Mar. 1983 148 p refs Transl. into ENGLISH from various Russian articles
(JPRS-83057) Copyright. Avail: NTIS HC A07

Several areas of life sciences and technology are addressed including radiation biology, public health, psychiatry, laser effects, and medicine. For individual titles, see N83-22989 through N83-22995.

N83-22989 Joint Publications Research Service, Arlington, Va.
PSYCHOLOGICAL COMPATIBILITY OF COMBAT FLIGHT CREWS **c53**
E. Besschetnov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 1-6 Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 12, Dec. 1982 p 30-31 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

Aviators are presented complex and responsible tasks of further increasing vigilance and combat readiness and improving fighting skills. Their successful solution depends upon many factors, including correct, scientifically-based manning of flight crews. The concept of psychological compatibility is reviewed. Author

N83-22990 Joint Publications Research Service, Arlington, Va.
LASER THERAPY **c52**
A. Rakhishev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 12-14 Transl. into ENGLISH from TRUD (Moscow), 22 Sep. 1982 p 3 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

With the discovery of artificial light sources, radiation therapy began to be used extensively. A qualitatively new stage is linked to the discovery of lasers. Their beams made it possible to administer treatment with strict dispensing of energy, for both the entire body and specific regions or active points. Two directions emerged in medicine in the early 1970's. Some researchers use high-power lasers, using their 'hard' radiation, as medical people say, as a light scalpel. Much work in this direction is being done in oncology, stomatology, ophthalmology and surgery. It is stated that surgery has become the laser's first medical profession. Researchers pursuing the other direction are studying the effects of low-intensity 'soft' radiation from gas lasers. Therapy became the second medical profession of lasers. Author

N83-22991 Joint Publications Research Service, Arlington, Va.
ELECTRON MICROSCOPE STUDY OF CHANGES IN OTIC LABYRINTH RECEPTORS UNDER EFFECT OF LASERS **c52**
M. P. Nikolayev, V. F. Anichin, O. P. Tokarev, and Yu. L. Tverskoy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 15-19 refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), no. 4, Jul.-Aug. 1982 p 39-43 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

Technological progress serves as grounds for physicians to search for the most effective and, at the same time, conservative forms of therapy. In this respect, use of lasers in medicine is spreading more and more. At the same time, this agent is still at the initial stage of development in otology, although the prospects (as applied to the otic labyrinth) are unquestionable. Laser radiation aimed at the cochlea elicits changes within a relatively limited area at the site of exposure to it, whereas other structures remain unchanged. When the vestibular part of the labyrinth (horizontal or posterior semicircular canals) of monkeys with overt vestibular disturbances was exposed to laser, hearing was retained. Use of pulsed neodymium laser aimed at the horizontal semicircular canal of monkeys, caused morphological changes to appear and they are strictly localized in the ampulla of the irradiated canal (deviation of cupula, consolidationa and fragmentation, dystrophic changes in receptor elements with sloughing off of the base of the cupula). Author

N83-22992 Joint Publications Research Service, Arlington, Va.
EFFECT OF ULTRAVIOLET LASER ON UNHEALING WOUNDS **c52**
I. Z. Nemtsev and L. I. Gerasimova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 20-24 refs Transl. into ENGLISH from Vestn. Khir. imeni I. I Grekova (Leningrad), v. 128, no. 1, Jan. 1982 p 95-98 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

There has been worldwide recognition of work dealing with the use of lasers for treatment of burns. It should be noted that, in burn treatment, lasers were used as a surgical tool that effected bloodless removal of necrotic tissues. At the same time, there are several works on therapeutic use of low-intensity lasers in the treatment of surgical wounds, burns and dermatosis. Burn wounds remaining after autoplastic surgery, the onset of which was most often related to autoimmune conflict, which were small in area and scattered in localization, that failed to heal for a long time served as an indication for the choice of this method of therapy. Laser therapy was also used to accelerate epithelialization of small wounds remaining after healing of 3A degree burns, which could not be prepared for autografting, in spite of use of the available

assortment of resources in the specialized burn department.
Author

N83-22993 Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSED LASER RADIATION ON EHRLICH'S ASCITES TUMOR CELL LYSOSOMES
K. G. Moskalik, Y. M. Ryazanov, V. V. Lazo, and K. Merkle *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 25-27 refs Transl. into ENGLISH from Vopr. Onkol. (Leningrad), v. 28, no. 4, Apr. 1982 p 42-44 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

A study was made of the effect of neodymium laser radiation (wavelength = 1.06 microns) on lysosomes of Ehrlich's ascites tumor cells. It was demonstrated that, with laser radiation energy density of 10 to 100 J/sq. cm. 1 to 4 h after in vitro exposure of tumor cells there was synchronous increase in free and total activity of acid phosphatase in the fraction of isolated lysosomes, which is the result of labilization of cytoplasmic membranes of tumor cells. It was also determined that laser radiation in the tested doses does not affect activity of acid phosphatase in an enzyme preparation.
Author

N83-22994 Joint Publications Research Service, Arlington, Va.
STUDY OF CYTOGENIC ACTION OF ELECTROSTATIC FIELD
V. F. Shakarnis and Ye. V. Kovalchuk *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 44-48 refs Transl. into ENGLISH from Izv. Akad. Nauk Latviyskoy SSR (Riga), no. 3, Mar. 1982 p 115-117 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

Researchers have been interested in studying electrostatic fields (ESFs) as a factor capable of disturbing a cell's genetic apparatus. This interest is associated primarily with the fact that were it discovered that such a field has a mutagenic effect, the problem of protecting man from ESFs, which are widely encountered in industry and in the home, would be raised in a new way.
Author

N83-22995 Joint Publications Research Service, Arlington, Va.
POSSIBILITIES FOR RAISING THERAPEUTIC EFFECT OF MAGNETOTHERAPY c52
M. S. Bruvele *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 49-54 refs Transl. into ENGLISH from Izv. Akad. Nauk Latv. (Riga), no. 9, Sep. 1982 p 118-121 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

The period of cautious introduction of magnetotherapy into clinical practice following experimental research has come to an end. The suitability of using this new physical factor was demonstrated, and procedures were developed for treating patients with different pathologies: vascular diseases of the brain and limbs, bone fractures, cerebrocranial injuries, the consequences of burns (contractures and scars), osteochondrosis, prevention of thrombus formation following injury and application of sutures, and many other diseases.
Author

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N83-22996* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 243)
Mar. 1983 80 p
(NASA-SP-7011(243); NAS 1.21:7011(243)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 282 reports, articles and other documents introduced into the NASA scientific and technical information system in February 1983.
Author

N83-22997# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
HUMAN RECTIONS TO ELF ELECTRIC AND MAGNETIC FIELDS. AN ANNOTATED BIBLIOGRAPHY OF CURRENT LITERATURE, 2ND EDITION
J. Patrick Reilly Jul. 1982 75 p
(PB83-110718; PPSP/JHU/PPSE-T-24) Avail: NTIS HC A04/MF A01 CSCL 06P

This annotated bibliography lists literature which applies to human reactions to electric and magnetic fields from 10 hz to 100 hz, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which use animal studies to draw interferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection.
GRA

N83-22998# Duke Univ., Durham, N. C.
EFFECTS OF 200, 591 AND 2450 MHz MICROWAVES ON CEREBRAL ENERGY METABOLISM
Aaron P. Sanders and William T. Joines Oct. 1982 72 p refs (Contract EPA-66-92-3233)
(PB83-116913; EPA-600/1-82-014) Avail: NTIS HC A04/MF A01 CSCL 06P

Earlier work has shown that levels of key biochemicals in the energy production system of rat brain are affected by exposure to 591 MHz microwave radiation at 13.8 mW/sq cm. The objectives of this study were to determine whether there are direct microwave effects on the biological system or whether they are secondary to the hyperthermia produced in the tissue, to establish dose-response relationships for the effects, and to investigate different frequencies of exposure and modulation of the carrier signal. The fluorescence of reduced nicotinamide adenine dinucleotide (NADH) in the rat brain was measured in vivo during exposure to the microwave radiation, and adenosine triphosphate (ATP) and creatine phosphate (CP) levels were measured chemically after exposure.
Author (GRA)

N83-22999# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MEDICAL ASPECTS OF SURVIVAL: TRAINING FOR AIRCREW
Th. Verheij Loughton, England Jan. 1983 23 p refs
(AGARD-AG-283; ISBN-92-835-1442-4) Avail: NTIS HC A02/MF A01

Maintenance of health, medical aid to survivors, general management of injuries, heat and cold exposure, specific injuries, survival illnesses, and medical aspects of escape and evasion are discussed.
Author

N83-22249# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SPACE MEDICINE
O. G. Gazenko and N. Panfilova *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 78-81 Transl. into ENGLISH from Meditsinskaya Gazeta (Moscow), 1 Oct. 1982 p 3 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22250# Joint Publications Research Service, Arlington, Va.
BLOOD CIRCULATION IN WEIGHTLESSNESS
O. G. Gazenko and A. M. Genin *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 82-84 Transl. into ENGLISH from Zdorovye (Moscow), no. 4, Apr. 1982 p 10-11 Previously announced as A82-35700 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22952# Argonne National Lab., Ill.
NEUTRON AND GAMMA RAY TOXICITY STUDIES
J. F. Thomson, D. Grahn, L. S. Lombard, F. S. Williamson, K. H. Allen, G. L. Holmblad, J. L. Hulesch, V. A. Ludeman, A. R. Sallese, E. F. Staffeldt et al *In* ANL Biol. and Med. Res. Jun. 1982

p 7-9 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22954# Argonne National Lab., Ill.
RADIATION-INDUCED HEMOPATHOLOGIES
T. M. Seed and L. V. Kaspar *In* ANL Biol. and Med. Res. Jun. 1982 p 15-17 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22957# Argonne National Lab., Ill.
MOLECULAR AND CELLULAR EFFECTS OF SOLAR ULTRAVIOLET LIGHT
M. J. Peak, J. G. Peak, R. W. Tuveson (Illinois Univ.), M. A. Turner (Missouri Univ.), and L. A. Nerad (Illinois Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 41-44 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22958# Argonne National Lab., Ill.
METAL METABOLISM AND TOXICITY
M. H. Bhattacharyya, R. P. Larsen, P. A. Benioff, H. C. Furr (Illinois Benedictine College), E. S. Moretti, R. D. Oldham, D. P. Peterson, M. I. Spaletto, and M. E. Shackelford (Illinois Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 51-53 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22959# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION
C. A. Reilly, Jr., F. R. Kirchner, T. Matsushita, M. J. Peak, K. E. Wilzbach, R. E. Jones, J. M. Leonardo, G. Kaufman, K. T. Blankenship (Chatham College), and R. M. Bressette (St. Benedict College) *In* ANL Biol. and Med. Res. Jun. 1982 p 59-63 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22960# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION: CHEMICAL CHARACTERIZATION
D. A. Haugen, M. J. Peak, V. C. Stamoudis, A. S. Boparai, C. A. Reilly, Jr., K. E. Wilzbach, K. M. Suhrbier, S. S. Dornfeld, D. Venters, and F. J. Tremmel (Iowa Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 65-68 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22961# Argonne National Lab., Ill.
NEUROBEHAVIORAL CHRONOBIOLOGY AND TOXICOLOGY
C. F. Ehret, A. L. Cahill, R. S. Rosenberg, P. H. Duffy, K. R. Groh, J. J. Russell, J. V. Barnett (Indiana State Univ.), A. S. Gulczynski (Northeastern Illinois College), R. Scott (Cheyney State College), and G. H. Thomsen (Tampa Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 69-72 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22962# Argonne National Lab., Ill.
BIOSTATISTICS AND HEALTH IMPACTS OF ENERGY TECHNOLOGIES
M. E. Ginevan, B. A. Carnes, J. J. Collins, C. D. Brown, J. R. B. Curtiss, N. Devine, and A. Rock (Michigan Univ.) *In* ANL Biol. and Med. Res. Jun. 1982 p 73-76 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22963# Argonne National Lab., Ill.
THE HUMAN PROTEIN INDEX
N. G. Anderson, N. L. Anderson, J. J. Edwards, C. S. Giometti, J. Taylor, K. E. Willard, M. A. Gemmell, S. L. Nance, A. E. Scandora (Science Applications, Inc.), and S. L. Tollaksen (Tougaloo College) *In* ANL Biol. and Med. Res. Jun. 1982 p 79-83 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-22975# Joint Publications Research Service, Arlington, Va.
USE OF LASERS IN HYGIENIC STUDIES
V. A. Kashuba and M. A. Matyashova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 36-40 refs Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 55-58 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

N83-22983# Joint Publications Research Service, Arlington, Va.
EFFECT OF SOME PHARAMACOLOGICALLY ACTIVE SUBSTANCES ON CYSTAMINE TRANSFORMATION IN MOUSE TISSUES
L. G. Tarnopolskaya *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 56-60 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 246-249 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

N83-22984# Joint Publications Research Service, Arlington, Va.
PROTECTIVE EFFECT OF HYPOXIC GAS MIXTURE ON COMBINED EXPOSURE TO RADIATION AND PHYSICAL LOAD
A. I. Britun, R. B. Strelkov, N. G. Kucherenko, and O. I. Kurochkina *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 61-64 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 250-252 Original language document was announced as A82-35653 (For primary document see N83-22979 12-51)
Copyright. Avail: NTIS HC A05

N83-22987# Joint Publications Research Service, Arlington, Va.
RADIOPROTECTIVE AND TOXICOLOGICAL PROPERTIES OF PHENYLETHYLAMINE DERIVATIVES MODIFIED WITH ALPHA AMINO ACIDS
T. Yu. Ilyuchenok, K. S. Shadurskiy, S. V. Rogozhin, V. G. Yashunskiy, L. M. Frigidova, V. I. butayeva, and Yu. A. Davidovich *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) 3 Mar. 1983 p 73-79 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 269-275 (For primary document see N83-22979 12-51)
Avail: NTIS HC A05

N83-22990 Joint Publications Research Service, Arlington, Va.
LASER THERAPY
A. Rakhishev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 12-14 Transl. into ENGLISH from TRUD (Moscow), 22 Sep. 1982 p 3 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

N83-22991 Joint Publications Research Service, Arlington, Va.
ELECTRON MICROSCOPE STUDY OF CHANGES IN OTIC LABYRINTH RECEPTORS UNDER EFFECT OF LASERS
M. P. Nikolayev, V. F. Anichin, O. P. Tokarev, and Yu. L. Tverskoy *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 15-19 refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), no. 4, Jul.-Aug. 1982 p 39-43 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

N83-22992 Joint Publications Research Service, Arlington, Va.
EFFECT OF ULTRAVIOLET LASER ON UNHEALING WOUNDS
I. Z. Nemtsev and L. I. Gerasimova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 20-24 refs Transl. into ENGLISH from Vestn. Khir. imeni I. I Grekova (Leningrad), v. 128, no. 1, Jan. 1982 p 95-98 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

N83-22995 Joint Publications Research Service, Arlington, Va.
POSSIBILITIES FOR RAISING THERAPEUTIC EFFECT OF MAGNETOTHERAPY
M. S. Bruvele *In its* USSR Rept.: Life Sci. Biomed. and Behavioral

Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 49-54 refs Transl. into ENGLISH from Izv. Akad. Nauk Latv. (Riga), no. 9, Sep. 1982 p 118-121 (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N83-23000# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
REGISTER OF RESEARCH IN PROGRESS ON MENTAL WORKLOAD
Thomas R. Metzler and Clark A. Shingledecker Jul. 1982 120 p refs
(AF Proj. 7184)
(AD-A122428; AFAMRL-TR-82-42) Avail: NTIS HC A06/MF A01 CSCL 05/9

This report documents current research on operator workload. The register was compiled from responses to a questionnaire data form sent to 76 scientists who are active in basic and applied workload research. The six sections of the register include name and key-term indexes, current project descriptions, listings of workload laboratories and potential sources of research support, and a bibliography of significant publications in the area.
Author (GRA)

N83-23001# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Human Engineering Div.
CONJOINT MEASUREMENT AND CONJOINT SCALING: A USERS GUIDE Technical Progress Report, Jun. - Aug. 1981
Thomas E. Nygren Apr. 1982 135 p refs
(AF Proj. 7184)
(AD-A122579; AFAMRL-TR-82-22) Avail: NTIS HC A07/MF A01 CSCL 12/1

Conjoint measurement methodology offers a new and potentially useful approach for obtaining psychological scale values for components of multidimensional attributes. This report describes the mathematical foundations of this methodology. Six computer based algorithms that can be used to perform specific kinds of conjoint analysis have been generalized and documented for application as subjective assessment techniques. The six programs (CONJOINT, PCJM2, NONMETRG, MONANOVA, DISTRIB, and DUALDIST) are each summarized with respect to their function as conjoint analysis techniques. Additionally, the appendix provides a step-by-step explanation of data deck arrangements for the programs described.
Author (GRA)

N83-23233# South African Airways, Johannesburg.
CHARACTERISTICS REQUIRED FOR PILOT SELECTION IN SOUTH AFRICAN AIRWAYS
P. H. J. Pienaar *In* CSIR Ann. Transportation Conv., Vol. 4 1982 15 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

N83-22989 Joint Publications Research Service, Arlington, Va.
PSYCHOLOGICAL COMPATIBILITY OF COMBAT FLIGHT CREWS
E. Besschetnov *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) 11 Mar. 1983 p 1-6 Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 12, Dec. 1982 p 30-3¦ (For primary document see N83-22988 12-51)
Avail: NTIS HC A07

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N83-23002*# National Academy of Sciences - National Research Council, Arlington, Va. Ad Hoc Committee on Aircrew-Vehicle System Interaction.
AN EVALUATION OF NASA'S PROGRAM IN HUMAN FACTORS RESEARCH: AIRCREW-VEHICLE SYSTEM INTERACTION
National Academy Press 1982 37 p refs
(Contract NASw-3455)
(NASA-CR-170143; NAS 1.26:170143) Avail: NTIS HC A03/MF A01 CSCL 05H

Research in human factors in the aircraft cockpit and a proposed program augmentation were reviewed. The dramatic growth of microprocessor technology makes it entirely feasible to automate increasingly more functions in the aircraft cockpit; the promise of improved vehicle performance, efficiency, and safety through automation makes highly automated flight inevitable. An organized data base and validated methodology for predicting the effects of automation on human performance and thus on safety are lacking and without such a data base and validated methodology for analyzing human performance, increased automation may introduce new risks. Efforts should be concentrated on developing methods and techniques for analyzing man machine interactions, including human workload and prediction of performance. S.L.

N83-23003# University of Southern California, Redondo Beach. Behavioral Technology Labs.
PROFILE: A TECHNIQUE FOR PROJECTING MAINTENANCE PERFORMANCE FROM DESIGN CHARACTERISTICS Technical Report, 1 Jul. 1981 - 1 Sep. 1982
Douglas M. Towne, Mark C. Johnson, and William H. Corwin Nov. 1982 75 p refs
(Contract N00014-80-C-0493)
(AD-A122452; TR-100) Avail: NTIS HC A04/MF A01 CSCL 09/2

The report describes PROFILE, a computer-aided technique for assessing the maintainability of a system, based upon a specification of the system's design. For each fault of interest, PROFILE generates a sequence of actions required to isolate and correct the malfunction, and it determines the time to perform the generated procedure by accessing a data bank of standard times for generic maintenance actions. The projections are sensitive to design characteristics which determine what actions must be performed to isolate and rectify the fault, and to factors which affect the time to perform those actions. A PROFILE analysis of a representative sample of failures yields a distribution of maintenance times and actions performed, to aid decision making throughout the design cycle. The projections of maintenance actions also are of potential value in assessing training requirements. Two experiments, using different electronic systems and technician populations, were conducted to obtain detailed corrective maintenance data. The corrective maintenance performances predicted by the model correspond well with the observed performances.
Author (GRA)

N83-23004# Navy Clothing and Textile Research Unit, Natick, Mass.
THE EXPERIMENTAL MOD 2 FIREFIGHTERS' ALUMINIZED CRASH-RESCUE FIRE-PROXIMITY HOOD: LIMITED SERVICE TEST Interim Report
Harry P. Winer Jul. 1982 16 p
(AD-A122409; NCTRF-143) Avail: NTIS HC A02/MF A01 CSCL 06/17

The Navy Clothing and Textile Research Facility (NCTRF) has developed the experimental Mod II Firefighters' Aluminized Crash-Rescue Fire-Proximity Hood, which improves upon the standard firefighters' aluminized hood (MIL-H-29144). Reports from the firefighting community have indicated that the standard hood

is not compatible with the current self-contained breathing apparatus. To allow for the self-contained breathing apparatus, a new aluminum frame with a greater front radius has been developed, and a liftup visor with an enlarged area for improved vision and voice communications has been incorporated in the experimental hood. This visor also reduces fogging of the face shield. Also, a bib is attached to the front to serve as a protective flap over the vacuum-deposited gold-coated facepiece when the hood is not being worn. NCTRF has conducted a limited service evaluation of the experimental Mod II hood. As a result of this evaluation, NCTRF recommends that a new latch system be developed for securing the visor. After completion of this development, another service evaluation of the experimental fire-proximity hood should be conducted. Author (GRA)

N83-23005# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
SUPERVISORY CONTROL OF UNDERWATER TELEMANIPULATORS: DESIGN AND EXPERIMENT Ph.D. Thesis
Dana R. Yoerger 30 Aug. 1982 227 p refs
(Contract N00014-77-C-0256; NR Proj. 196-158)
(AD-A123632) Copyright. Avail: Issuing Activity

Supervisory control was investigated as a means to improve the performance of remotely controlled underwater manipulator systems. A system was designed and implemented on a laboratory manipulator and on an underwater device. Author

N83-23006# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
SPACE ROBOTICS Interim Report
Richard E. Korf Aug. 1982 59 p refs
(ARPA Order 3597)
(AD-A121484; CMU-RI-TR-82-10) Avail: NTIS HC A04/MF A01 CSCL 22/2

This report surveys the possible applications and technical feasibility of robots in space. The future space program in the time frame of 1980-2000 is first assessed, including space exploration, global information services and space utilization. The critical technologies needed to support the projected space program are then considered, including the need for general purpose, remote intelligence and manipulation. Teleoperators are discussed as a possible means of meeting this requirement and are found not to be satisfactory due to communication time delays and bandwidth limitations, and human costs and performance limits. Autonomous space robots are proposed as a solution and several detailed scenarios for their use are presented. The technical feasibility of space robotics is evaluated by examining the requirements, state of the art, and research needed for each of the subsystems of a space robot. These include manipulators, sensors, navigation, guidance, propulsion, surface locomotion, computing and control, communications, electrical power, and spacecraft structure. Finally, a research program is outlined for the development of autonomous space robots. Author (GRA)

N83-22252# Joint Publications Research Service, Arlington, Va.
EQUIPMENT FOR COSMONAUT EVA
G. G. Bebenin and Yu. N. Glazkov *In its* USSR Rept.: Space, No. 20 (JPRS-82970) 28 Feb. 1983 p 92-98 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 3, May - Jun. 1982 p 31-34 (For primary document see N83-22239 12-12)
Avail: NTIS HC A08

N83-22978# Joint Publications Research Service, Arlington, Va.
HUMAN FACTOR IN CONTROL SYSTEMS
Georgiy Lvovich Smolyan and Kim Vasilyevich Tobolev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) 21 Jan. 1983 p 69-107 refs Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhn.: Ser. Mat., Kibernetika (Moscow), no. 9, Sep. 1974 p 1-62 (For primary document see N83-22970 12-51)
Avail: NTIS HC A06/MF A01

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N83-23007# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
SYMPOSIUM ON CONTROL THEORY AND APPLICATIONS
1982 283 p refs In ENGLISH and AFRIKAANS Symp. held in Pretoria, 17-18 Jun. 1982; sponsored by CSIR, South African Council for Automation and Computation, and South African Mathematical Society
(ISBN-0-7988-2413-1) Avail: NTIS HC A13/MF A01

Control engineering, control theory, adaptive control, control engineering, and computation are addressed. For individual titles, see N83-23008 through N83-23025.

N83-23008# La Trobe Univ., Melbourne (Australia). Dept. of Mathematics.
TECHNIQUES FOR CONSTRAINED OPTIMIZATION c61
B. Mond *In* NRIMS Symp. on Control Theory and Appl. 1982 11 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

Various techniques for solving nonlinear mathematical programming problems are discussed. In particular, some extensions of the simplex method to nonlinear problems are considered. Also, penalty and combined multiplier and penalty methods are outlined. Finally, a possible application of nonlinear programming routines to the solution of control problems is indicated. Author

N83-23009# Institute for Maritime Technology, Simonstown (South Africa).
A SURVEY OF CLASSES OF METHODS FOR THE ITERATIVE SOLUTION OF OPTIMAL CONTROL PROBLEMS c63
D. M. Murray *In* NRIMS Symp. on Control Theory and Appl. 1982 25 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

Optimal control theory is introduced as an extension of classical and modern control theory. The mathematical formulation of optimal control problems leads to a statement of optimality conditions which suggests different classes of approaches for the determination of optimal controls. After a general discussion of these classes, second order methods are selected for a more detailed discussion and finally a few second order methods are singled out to illuminate algorithmic specifics. Author

N83-23010# Pretoria Univ. (South Africa). Dept. of Electronic Engineering.
DESIGN OF FEEDBACK CONTROL SYSTEMS c63
O. H. Rubin *In* NRIMS Symp. on Control Theory and Appl. 1982 11 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The scenario around the design and development of a practical, relatively complex control system is described. A design philosophy is proposed, employing the heuristic application of classical design techniques. Ways are proposed of improving system performance by exploiting results from modern control theory. Author

N83-23011# Electricity Supply Commission, Johannesburg (South Africa). Data Processing Systems Dept.
PUMP-TURBINE BOUNDARY CONDITIONS MODELLING FOR PUMPED STORAGE SCHEME CONTROL POLICY SIMULATION

c44

A. M. W. Brauer *In* NRIMS Symp. on Control Theory and Appl. 1982 5 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The indirect method of pump-turbine boundary conditions modelling is presented. This method makes use of pump-turbine model's steady-state data in order to evaluate machine characteristics' partials. Practical application of the method in non-linear simulation of the Drakensberg Pumped Storage Scheme's open loop dynamic behavior study is described. Usefulness of the method for closed loop control policy investigations is touched upon.
Author

N83-23012# Rand Afrikaans Univ., Johannesburg (South Africa). Dept. of Electrotechnical Cybernetics.
A DESIGN PROCEDURE FOR A MISSILE AUTOPILOT c15
J. A. Coetsee (Kentron Ltd.) and J. J. Krueger *In* NRIMS Symp. on Control Theory and Appl. 1982 17 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

A design procedure for missile autopilots incorpating a bang-bang element is discussed. The missile autopilot design is put into perspective by examining its function in the context of the guidance system. Attention is then given to the design of a pitch-autopilot system. An overview of the dynamics of the missile is given, followed by the development of a control strategy. The choice of a fixed parameter bang-bang control system leads to a design procedure which follows the course of determining performance specifications, linearizing the airframe model, using the dual-input describing function technique to analyze the bang-bang element, and a final evaluation and tuning of the control system.
Author

N83-23013# Gold Fields of South Africa Ltd., Johannesburg.
STABILIZATION AND OPTIMIZATION CONTROL OF A CONCENTRATOR WITH SPECIAL REFERENCE TO THE CONTROL STRATEGIES USED AT THE BLACK MOUNTAIN MINE c61
P. Nienaber *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

Process computer systems are currently in general use for increasing recovery, capacity, safety and control in the chemical process industry. The application of digital computers and statistical analysis resulted in stabilization of the process within a period of one year from start up. To implement the overall control stragety of operating the different flotation stages in a steady state in respect to assays of slurries and concentrates, and instrumentation system complemented with an X-ray on-stream analyzer and stabilization and optimization computer systems was installed. The system is described and the tuning of the direct digital and supervisory control loops and the procedures adopted to establish a data base for optimization control are covered.
Author

N83-23014# Council for Scientific and Industrial Research, Pretoria (South Africa). Control System Div.
THE COMPUTER-BASED CONTROL SYSTEM OF THE NAC ACCELERATOR c72
G. F. Burdzik, R. F. A. Bouckaert, I. Cloete, J. S. duToit, I. H. Kohler, J. N. J. Truter, K. Visser, and V. C. St. J. Wikner (Southern Universities Nuclear Inst.) *In* NRIMS Symp. on Control Theory and Appl. 1982 12 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The National Accelerator Center (NAC) of the CSIR is building a two-stage accelerator which will provide charged-particle beams for use in medical and research applications. The control system for this accelerator is based on three mini-computers and a CAMAC interfacing network. Closed-loop control is being relegated to the various subsystems of the accelerators, and the computers and CAMAC network will be used in the first instance for data transfer, monitoring and servicing of the control consoles. The processing power of the computers will be utilized for automating start-up and beam-change procedures, for providing flexible and convenient information at the control consoles, for fault diagnosis and for beam-optimizing procedures. Tasks of a localized or dedicated nature are being off-loaded onto microcomputers, which are being used either in front-end devices or as slaves to the mini-computers. On the control consoles only a few instruments for setting and monitoring variables are being provided, but these instruments are universally-linkable to any appropriate machine variable.
Author

N83-23015# Council for Scientific and Industrial Research, Pretoria (South Africa). Mathematics and Dynamic Meteorology Div.
AN ALTERNATIVE APPROACH TO NONLINEAR FILTERING: MAXIMIZING THE PROBABILITY OF HITTING A TARGET SET c65
Y. Yavin *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs Sponsored in part by a grant for Control Data Submitted for publication (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

A nonlinear filtering problem is discussed. Sufficient conditions on weak optimal gain matrices are derived, and as these conditions are given by a set of two coupled nonlinear partial differential equations in which the coupling constitutes a very complicated optimization problem, a procedure is suggested for computing weak suboptimal gain matrices, and these are computed for a variety of cases.
Author

N83-23016# National Research Inst. for Mathematical Sciences, Pretoria (South Africa). Mathematics and Dynamic Meteorology Div.
POLYNOMIAL SYSTEMS AND DUALITY c64
G. Naude and C. Nolte *In its* Symp. on Control Theory and Appl. 1982 5 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

Discrete time polynomial systems which are described by equations of the form x(t+1) = P sub u (X(t) y(t) = R x(t) where u epsilon U, the input set, and P sub u and R are polynomial maps were investigated by use of the Arbib-Manes model of machines in a category. Basic results on the existence and uniqueness of minimal realizations are presented. A duality theory between polynomial systems and algebra systems, similar to the well known Kalman duality between the reachability and observability of finite dimensional linear systems is outlined.
E.A.K.

N83-23017# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
ADVANCES IN MODEL FOLLOWING ADAPTIVE CONTROL THEORY c63
S. G. McLaren and A. P. Hathorn *In its* Symp. on Control Theory and Appl. 1982 18 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The ideas of model reference adaptive control systems are outlined and the advantages and problems introduced by a simple example. The problem of stability is considered by the concept of hyperstability, which is applied to the derivation of the error model, adaptive control law and the controller output. The problem of implementation is considered and the successful application to ships' autopilots is cited.
E.A.K.

N83-23018# Witwatersrand Univ., Johannesburg (South Africa). Dept. of Electrical Engineering.
A NON-PARAMETRIC SELF-TUNING CONTROLLER c63
M. A. Heilbrunn (Council for Mineral Technol.) and I. J. Barker (Council for Mineral Technol.) *In* NRIMS Symp. on Control Theory and Appl. 1982 14 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

A nonparametric self tuning controller is derived by equating open and closed loop dynamics. A simplified least squares method is used for estimation of the coefficients for the model. The stability

and convergence properties of the controller are shown by simulation and implementation. E.A.K.

N83-23019# Natal Univ., Durban (South Africa). Dept. of Electrical Engineering.
OPTIMAL AND MULTIVARIABLE CONTROL OF A TURBOGENERATOR **c33**
M. A. Lahoud, R. G. Harley, and A. Secker *In* NRIMS Symp. on Control Theory and Appl. 1982 26 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The use of modern control methods to design multivariable controllers which improve the performance of a turbogenerator was investigated. The turbogenerator nonlinear mathematical model from which a linearized model is deduced is presented. The inverse Nyquist Array method and the theory of optimal control are both applied to the linearized model to generate two alternative control schemes. The schemes are implemented on the nonlinear simulation model to assess their dynamic performance. Results from modern multivariable control schemes are compared with the classical automatic voltage regulator and speed governor system. E.A.K.

N83-23020# Rand Afrikaans Univ., Johannesburg (South Africa). Fakulteit Ingenieruswese.
STRATEGY FOR THE DYNAMIC CONTROL OF A MULTIPHASE INDUCTION MACHINE [STRATEGIE VIR DIE SINAMIESE BEHEER VAN 'N MULTIFASE INDUKSIEMASJIEN] **c33**
J. Du. Rand, J. J. Krueger, and J. D. VanWyk *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs In AFRIKAANS; ENGLISH summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The nonlinear, coupled structure of a multiphase induction machine was compared to the linear, decoupled structure of a separately excited direct current machine. Using the concept of field orientated control of Blaschke, the complex structure of the induction machine can be transformed to a structure similar to that of a dc motor. The locus of the Parkvector of the stator current is analyzed by this model and the limitations on the locus for the different modes of operation of the machine are formulated. The proposed controller has a greater dynamic range as compared to the traditional controllers. The configuration of the proposed controller and simulation results are discussed. E.A.K.

N83-23021# Pretoria Univ. (South Africa). Dept. of Electronic Engineering.
ACCURACY LIMITS ON DIGITAL SIMULATION OF CONTINUOUS SYSTEMS **c61**
O. H. Rubin *In* NRIMS Symp. on Control Theory and Appl. 1982 12 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The solution of differential equations on a digital computer by a difference equation approximation is considered. Truncation and roundoff errors are analyzed and multiprocessor realizations are discussed. E.A.K.

N83-23022# Electronic Associates, Inc., Long Branch, N.J.
A SURVEY OF HYBRID COMPUTER USES IN CONTROL SYSTEM DESIGN **c61**
Ronald M. Maslo *In* NRIMS Symp. on Control Theory and Appl. 1982 24 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The scope of the use of a hybrid computer in the design of control systems was illustrated. A number of applications are discussed and, specifically, the results of a study of compressor surge are presented. E.A.K.

N83-23023# Witwatersrand Univ., Johannesburg (South Africa). Dept. of Electrical Engineering.
IMPLEMENTATION OF THE THREE-TERM CONTROL ALGORITHM IN SMALL COMPUTERS **c61**
I. M. MacLeod *In* NRIMS Symp. on Control Theory and Appl. 1982 13 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The importance of the standard three term (proportional-integral-derivative) algorithm in process control is outlined. Recommendations are made concerning the choice of discrete approximations for digital computer implementation of saturation is discussed and an efficient digital computer algorithm which includes a filtered derivative calculation and protection from saturation is given. The choice of fixed point or floating point arithmetic in implementation of the algorithm is discussed. E.A.K.

N83-23024# Pretoria Univ. (South Africa). Dept. of Applied Mathematics.
THE DEVELOPMENT OF A CONVERGENT ALGORITHM FOR LARGE UNCONSTRAINED MINIMIZATION PROBLEMS **c61**
J. A. Snyman *In* NRIMS Symp. on Control Theory and Appl. 1982 14 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

A gradient method for unconstrained minimization, in which the problem is solved via consideration of the analogous physical problem of the motion of a particle of unit mass in a n-dimensional conservative force field was developed. The function to be minimized is that one which represents the potential particle energy. A Euler forward/Euler backward numerical scheme is used to integrate the equations of motion and is applied to meet strictly convex functions a sufficient condition for descent at each time step. This results in the method is convergent to the unique optimal solution. The performance of an algorithm, LFOP2, embodying this method, is compared with that of Powell's well established conjugate gradient algorithm, ZXCGR, when applied to three different test functions of extended dimensionality. E.A.K.

N83-23025# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
MULTIVARIABLE POLYNOMIAL POSITIVITY TESTING **c64**
D. H. Martin *In its* Symp. on Control Theory and Appl. 1982 8 p refs Sponsored in part by a grant from Control Data (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

The use of a test for the positivity of real multivariable polynomials on rectangular domains was presented the case of unbounded domains is in need of reexamination. The present note extends the scope of the Walach-Zeheb test to include arbitrary closed domains, and clarifies what is entailed in the case of unbounded domains. It is shown that the test actually tests for strong positivity, for the existence of positive lower bounds. E.A.K.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N83-23026# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ASPECTS OF AN IMAGE VISUALIZATION SYSTEM M.S. Thesis [ASPECTOS DE UM SISTEMA DE VISUALIZACAO DE IMAGENS]
Paolo Pio Gabriele Camilli Mar. 1983 77 p refs In PORTUGUESE; ENGLISH summary
(INPE-2682-TDL/125) Avail: NTIS HC A05/MF A01

Image display systems are a prime part in image processing facilities. They consist in a digital image memory and circuits for image analysis and display. The structure of such equipment is presented. Leading technical problems are discussed and already verified solutions presented. A comparison of the system with a commercially available unit is presented. Author

N83-23027# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF COMPUTERS (SELECTED ARTICLES)
14 Oct. 1982 105 p ref Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 321-371
(AD-A122743; FTD-ID(RS)T-0369-82) Avail: NTIS HC A06/MF A01 CSCL 09/2

The operating system, job control language, virtual storage, input/output management, and testing and debugging for the CZXT-013 computer are discussed. For individual titles, see N83-23028 through N83-23034.

N83-23028# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CZXT-013 AND SOME PROBLEMS IN ITS IMPLEMENTATION
Liu Guo-Heng *In its* J. of Computers (Selected Articles) (FTS-ID(RS)T-0369-82) 14 Oct. 1982 p 1-11 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 321-325 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01

The function and structure of CZXT-013, which is an operating system on the computer 013, are described. Some problems in CZXT-013 design and implementation, such as resource management, process communication and so on, are discussed. Author

N83-23029# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CZXT-013: A HIERARCHICAL OPERATING SYSTEM
Zhang You-La and Jia Yao-Mei *In its* J. of Computers (Selected Articles) (FTD-ID(RS)T-0369-82) 14 Oct. 1982 p 12-31 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 326-332 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

A batch-processing operating system, CZXT-013 is capable of handling eight jobs simultaneously. The architecture design for the system, i.e., the design objectives and the tools (hierarchy, process and modularity) which are needed to realize the objectives is discussed. The kernal primitives and their design considerations are illustrated in detail, the function of each process, process control and communication are also described. The experiences gained in the course of design are presented at the end. Author

N83-23030# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE DESIGN OF THE CZXT-013 JCL (JOB CONTROL LANGUAGE) AND THE IMPLEMENTATION OF JOB CONTROL
Chan Hua-Ying and Lu Yu-zhen *In its* J. of Computers (Selected Articles) (FTD-ID(RS)T-0369-82) 14 Oct. 1982 p 32-48 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 336-342 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

A user-oriented job control language CZXT-013 JCL is described. The design principle and some specific commands are presented. Some key problems in realizing the CZXT-013 job control, such as event and condition command, information notification and log file, log-out treatment and fault treatment, are discussed and their processing methods are also given. Author

N83-23031# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE JOB MANAGEMENT IN CZXT-013
Jin Qu-jie and Zhen Zeng-Zhen *In its* J. of Computers (Selected Articles) (FTD-ID(RS)T-0369-82) 14 Oct. 1982 p 49-62 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 344-350 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

A batch processing operating system, CZXT-013, which also facilitates on-line operations is described. The system can accommodate three different types of jobs to operate simultaneously. The job scheduling scheme of the CEXT-013 system is realized in three levels is introduced. The states of the job in different stages from entering to leaving the system; the state transitions; the preparations for the job; and the handling procedures of jobs under normal and abnormal departures are also introduced. Author

N83-23032# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MANAGEMENT OF VIRTUAL STORAGE ON CZXT-013
Fan Ben-Kui *In its* J. of Computers (Selected Articles) (FTS-ID(RS)T-0369-82) 14 Oct. 1982 p 63-80 ref Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 352-358 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

A page multiple virtual storage system, CZXT-013, is described. The management technique of virtual storage from the software point of view is introduced. It described how virtual storage is realized from the auxiliary storage management, mass storage management and page management (page fault treatment, page replacement rule, etc.). It then discussed the efficiency of the virtual storage and analyzed the effect of several prime factors on the efficiency of the virtual storage. Author

N83-23033# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INPUT/OUTPUT MANAGEMENT OF CZXT-013
Li Zhi-cheu, Gu Yu-Qing, Zheng Li-jun, and Zhao Wen-qin *In its* J. of Computers (Selected Articles) (FTD-ID(RS)T-0369-82) 14 Oct. 1982 p 93-101 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 p 361-365 (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

The input/output management of the CZXT-013 machine is divided into two parts, i.e., the logical device management and the physical device management. This article emphasizes the introduction of the logical device, format processing and device management and their corresponding characteristics. Author

N83-23034# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CZXT-013 TESTING AND DEBUGGING
Liu Guo-Heng and Cai Chun-lei *In its* J. of Computers (Selected Articles) (FTD-ID(RS)T-0369-82) 14 Oct. 1982 p 93-101 Transl. into ENGLISH from Jisuanji Xuebao (China), v. 4, no. 5, 1981 9 p (For primary document see N83-23027 12-60)
Avail: NTIS HC A06/MF A01 CSCL 09/2

The valuation between the reliability and testing of the operating system is first discussed. Then, the emphasis is placed on the introduction of the testing method of the operating system of the 013 machine and the two testing tools, the process tester and the system monitor, which are used in the unit testing phase and the integration testing phase, respectively. The process tester is a common testing program for the testing of the process module block. The system monitor is an information collection and output program added on to the system control center. Author

N83-23035# New York Univ., New York. Mathematics and Computing Lab.
WIREABILITY OF AN ULTRACOMPUTER
Ronald Bianchini and Ronald Bianchini, Jr. Oct. 1982 27 p refs (Contract DE-AC02-76ER-03077; Grant NSF MCS-79-07804)
(DE83-004269; DOE/ER-03077/177) Avail: NTIS HC A03/MF A01

The wireability of an Ultracomputer, a shared-memory MIMD parallel machine with thousands of processing elements, wired using an Omega connection network was analyzed a way of structuring hardware involving large numbers of processors into smaller subsets of processors and switches was demonstrated. A design with 4096 processors, based on pesent day wiring technology and electrical power considerations, is presentd. This design assumes a 2 x 2 switch on a chip is available, also a 1 megabit memory chip and a high speed microprocessor chip with 32 bit addressing. DOE

N83-23036# Brookhaven National Lab., Upton, N. Y. ISABELLE Data Acquisition Group.

MICROPROCESSORS IN DETECTORS AND ANALYSIS
Eric J. Siskind 1982 5 p refs Presented at the Intern. Conf. on Instrumentation for Colliding Beam Phys., Stanford, Calif., 17 Feb. 1982 Sponsored by DOE
(DE82-012025; BNL-30929; CONF-820237-2) Avail: NTIS HC A02/MF A01

The increasing need in high energy physics (HEP) experiments for computation power for both online and offline applications, coupled with the current microprocessor revolution, led to the examination of the use of microprocessors in various aspects of HEP computing. A brief (and admittedly somewhat biased) review is given of current hardware products, the costs of developing and producing hardware systems, and the costs of providing appropriate software support tools which allow one to make effective use of physicists' time, and the applicability of certain systems to the various needs of HEP computing. DOE

N83-23037# Edgerton, Germeshausen and Grier, Inc., Albuquerque, N. Mex. Energy Measurements Group.
INPUT FILE FORMATTER FOR MINI-COMPUTERS
Michael J. Hoy 1982 9 p Presented at the Fall DECUS US Symp., Anaheim, Calif., 6 Dec. 1982
(Contract DE-AC08-76NV-01183)
(DE82-017069; EGG-1183-6003; CONF-821201-1) Avail: NTIS HC A02/MF A01

This program is designed to aid computer users in the generation of input data files. These input data files are assumed to be input to another program of a specific nature. FMAT interprets a simple four word language and builds input data files as directed by this language. It also allows a format for user defined prompts. In this way, a user can build his own prompts and construct the data input file to meet the needs of a specific program. FMAT is based on the use of symbolic variables. A symbolic variable is a variable that holds a place in a line or character string. As the string is processed and a symbolic variable is found, the desired value is substituted for the symbolic variable. In this way, the values that are returned from a prompt are the values that actually go into the data file. DOE

N83-23038# California Univ., Berkeley. Lab. for Electronics Research.
VLSI COMPLEXITY OF SORTING
C. D. Thompson Feb. 1982 41 p refs
(Grants NSF ECS-81-10684; DAAG29-78-G-0167)
(PB83-112847; UCB/ERL-M82/5; NSF/ECS-82003) Avail: NTIS HC A03/MF A01 CSCL 09B

The area-time complexity of sorting is analyzed under an updated model of VLSI computation. The new model distinguishes between processing and memory circuits. Other adjustments to the model allow a comparison between pipelined and non-pipelined designs. Thirteen different designs for VLSI sorters are described and their sorting circuits are used to document the existence of an area-time tradeoff for the sorting problem. The area-time performance figure for all but three of the designs is close to the theoretical minimum value. GRA

N83-23039# National Bureau of Standards, Washington, D.C. Center for Applied Mathematics.
A SYSTEMS PROGRAMMERS GUIDE FOR INSTALLING OMNITAB 80 Final Technical Note
Shirley G. Bremer and Sally T. Peavy Aug. 1982 76 p refs
(PB83-115584; NBS-TN-1163; COM-71-00068) Avail: NTIS HC A05/MF A01 CSCL 09B

OMNITAB 80 is a general-purpose package which permits direct use of a computer without prior knowledge of computer languages. Every effort has been made to produce a system as computer independent as possible to make installation on any large computer configuration relatively easy. This Technical Note provides assistance to the systems programmer, with the task of installing OMNITAB 80, by pointing out where difficulties may occur and how to resolve them. The Note is intended more as reference material, since all modifications for a particular configuration are made prior to the distribution of the OMNITAB 80 system. OMNITAB 80 is a large system requiring a large computer. Overlay or segmentation is virtually essential. A method, that is employed at the National Bureau of Standards, for overlaying OMNITAB 80 is outlined. The method should be useful for other computer configurations. GRA

N83-23040# National Weather Service, Silver Spring, Md. Forecast Office.
A SUBROUTINE TO FIND AND EXTRACT DATA FROM AN AFOS DATABASE PRODUCT
Robert L. Somrek May 1982 27 p ref
(PB83-118828; NOAA-NWS-CRCP-3; NOAA-82092002) Avail: NTIS HC A03/MF A01 CSCL 09B

A subroutine consisting of routines FIND and XTRACT has been written to aid in searching for and extracting data from AFOS database products. The search routine, FIND, will locate the occurrence and position of a user-defined pattern in the AFOS product. The implementation of metacharacters to alter the normal search process makes the routine very flexible. The extraction routine, XTRACT, will retrieve a copy of the data as well as locate it in the AFOS product. The subroutine runs within the environment of the calling program. It is designed to be called from a program running in the background partition of the AFOS Eclipse S/230 minicomputer. The routines FIND and XTRACT are written in Data General's assembly language for the Eclipse. The routines have been combined into a single subroutine with two entry points. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N83-23041# Merlin Gerin, Grenoble (France).
METHOD FOR DEVELOPING A SECURITY SOFTWARE [METHODE DE DEVELOPPEMENT D'UN LOGICIEL DE SURETE]
Andre Jourdil and Richard Galera Sep. 1982 24 p refs In FRENCH
(Cahiers-Techniques-117) Avail: NTIS HC A02/MF A01

The use of reliability software does not depend solely on the engineer's art. It requires a rigorous methodology and a special organization. Such a method is presented and evaluated in the context of constructing protection equipment for a 1,300 MW nuclear power station. The division of study, permanent control, and the organization of equipment are discussed as well as the verification of organic analysis, static verification of coding, and programmers' tests. Transl. by A.R.H.

N83-23042*# Computer Software Management and Information Center, Athens, Ga.
COMPUTER SOFTWARE MANAGEMENT, EVALUATION, AND DISSEMINATION Monthly Progress Report, Feb. 1983
15 Mar. 1983 31 p
(Contract NASw-3247)
(NASA-CR-170201; NAS 1.26:170201) Avail: NTIS HC A03/MF A01 CSCL 09B

The activities of the Computer Software Management and Information Center involving the collection, processing, and distribution of software developed under the auspices of NASA and certain other federal agencies are reported. Program checkout and evaluation, inventory control, customer services and marketing, dissemination, program maintenance, and special development tasks are discussed. M.G.

N83-23043*# Computer Software Management and Information Center, Athens, Ga.
REVIEW OF THE ACTIVITIES OF COSMIC Annual Report, 1 Jan. - 31 Dec. 1982
James L. Carmon Jan. 1983 61 p
(Contract NASw-3247)
(NASA-CR-170200; NAS 1.26:170200) Avail: NTIS

HC A04/MF A01 CSCL 09B

The activities of the Computer Software Management and Information Center involving the collection, processing, and distribution of software developed under the auspices of NASA and certain other federal agencies are reported. Program checkout and evaluation, inventory control, customer services and marketing, dissemination, program maintenance, and special development tasks are discussed. M.G.

N83-23044*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SOFTWARE ENGINEERING LABORATORY (SEL) PROGRAMMER WORKBENCH PHASE 1 EVALUATION

Mar. 1981 29 p refs

(NASA-TM-85300; SEL-81-009; NAS 1.15:85300) Avail: NTIS HC A03/MF A01 CSCL 09B

Phase 1 of the SEL programmer workbench consists of the design of the following three components: communications link, command language processor, and collection of software aids. A brief description, and evaluation, and recommendations are presented for each of these three components. Author

N83-23045*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

MULTI-LEVEL EXPRESSION DESIGN LANGUAGE: REQUIREMENT LEVEL (MEDL-R) SYSTEM EVALUATION

May 1980 92 p refs

(NASA-TM-85302; SEL-80-002; NAS 1.15:85302) Avail: NTIS HC A05/MF A01 CSCL 09B

An evaluation of the Multi-Level Expression Design Language Requirements Level (MEDL-R) system was conducted to determine whether it would be of use in the Goddard Space Flight Center Code 580 software development environment. The evaluation is based upon a study of the MEDL-R concept of requirement languages, the functions performed by MEDL-R, and the MEDL-R language syntax. Recommendations are made for changes to MEDL-R that would make it useful in the Code 580 environment. Author

N83-23046# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

METHODS OF IMAGE REGISTRATION USING SEQUENTIAL TESTS OF HYPOTHESIS TECHNIQUES Ph.D. Thesis [METODOS DE REGISTRO DE IMAGENS USANDO TECNICAS DE TESTES SEQUENCIAIS DE HIPOTESES]

Jose Antonio Goncalves Pereira Mar. 1983 97 p refs In PORTUGUESE; ENGLISH summary

(INPE-2681-TDL/124) Avail: NTIS HC A05/MF A01

Since their appearance in 1972, the Sequential Similarity Detection Algorithms have become the most attractive alternative to the cross-correlation in the solution of the image translational registration problem. This class of algorithms, although extremely efficient from the computational point of view, has a limited resolution of one pixel, and it is impossible to establish the theoretical rejection thresholds, unless in the binary image case. Trying to provide other possibilities for this calculation, the present work studies, using Sequential Tests of Hypothesis techniques, two possible testing parameters that would eventually provide better theoretical evaluation of the thresholds and/or a greater independence of the same parameters. Up to the moment, the test of the variance of the difference of the images, assumed gaussian, and the test of the mean of the difference of the images, binarized around their means, were implemented. Experimental results are also shown that indicate real possibilities for the two methods. Possible future extensions, tests and comparisons with actual methods are presented. Author

N83-23047# Institut National des Sciences Appliquees, Lyon (France).

COMPUTER AIDED DESIGN. A CONTRIBUTION TO THE TECHNICAL AND ECONOMIC EVALUATION OF STRUCTURES AND INTERIOR EQUIPMENT Ph.D. Thesis [CONCEPTION ASSISTEE PAR ORDINATEUR: CONTRIBUTION A L'EVALUATION TECHNIQUE ET ECONOMIQUE DE STRUCTURE ET SECOND OEUVRE D'AVANT PROJETS DE BATIMENTS]

Jacques Dufau 1981 295 p refs Prepared in cooperation with Lyon Univ.

(I-DE-81-07) Avail: NTIS HC A13/MF A01

A methodology of building cost analysis was developed, and the associate programs were elaborated. Based upon quantity estimation from few data, these programs allow to check technical parameters and to make an economic evaluation of envelopes, structure elements and interior equipment. Author

N83-23048*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

USE OF INTERACTIVE GRAPHICS TO ANALYZE QUICK-GEOMETRY

James C. Townsend Dec. 1981 50 p refs

(NASA-TM-83234; NAS 1.15:83234) Avail: NTIS HC A03/MF A01 CSCL 09B

The QUICK InterActive Graphics Analysis (QUIAGA) program and its advantages for displaying aircraft QUICK-geometry to aid in detection and analysis of errors are described. The QUICK-geometry system generates a completely analytical aircraft geometry description for use by finite-difference flow codes. The QUIAGA program was developed to exercise the QUICK-geometry subroutines to examine the analytic definition of a configuration by plotting cross sections and body lines on a graphics terminal. A number of options are available, including multiple cross-section views, hidden-line removal, and display of control point locations. Use of these options for the detection and analysis of errors in the QUICK-geometry definition can be of great assistance in speedily arriving at a correct analytical geometry description for flow-field computation. The QUIAGA program has been used in developing a QUICK-geometry model of the NASA Space Shuttle Orbiter, and examples from this experience are given to show some of the program's features. Details of program usage and an example session are given in the appendixes. Author

N83-23049*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

USE OF INTERACTIVE GRAPHICS TO ANALYZE QUICK-GEOMETRY: SUPPLEMENT

James C. Townsend Jul. 1982 14 p

(NASA-TM-83234-Suppl; L-15295; NAS 1.15:83234-Suppl) Avail: NTIS HC A02/MF A01 CSCL 09B

The advantages of using interactive computer graphics to display aircraft geometry to aid in detection and analysis of errors are described. The QUICK geometry system is reviewed and the Quick Interactive Graphics Analysis (QUIAGA) program is described. This QUIAGA program was developed to exercise the QUICK geometry subroutines to examine in several modes on a graphics terminal. Its use in the detection and analysis of errors in the QUICK geometry definition can be of great assistance in speedily arriving at a correct analytical geometry description for flow field computation. Experience with the program in developing a QUICK geometry model of the NASA Space Shuttle Orbiter is used to show some of its features. Appendixes giving details of program usage and an example session are included. Author

N83-23050# Naval Postgraduate School, Monterey, Calif.

INVESTIGATION OF THE ADA LANGUAGE IMPLEMENTATION OF THE HELLENIC COMMAND CONTROL AND INFORMATION SYSTEM M.S. Thesis

Apostolos Koutsotolis Jun. 1982 78 p refs

(AD-A122435) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis examines the features of the ADA language, describes the structure of the Hellenic Command Control and Information System (HCCIS) and investigates the use of ADA for the program development of HCCIS. The Ada high order programming language system is being procured to act as a standard for the implementation of future United States embedded computer systems. Many benefits are claimed from this approach for software engineering and management practice. HCCIS is a future system

which will provide a network of automatic data processing support at Commands. GRA

N83-23051# Stanford Univ., Calif. Dept. of Computer Science.
SPECIAL RELATIONS IN PROGRAM-SYNTHETIC DEDUCTION
Zohar Manna (SRI International Corp., Menlo Park, Calif.) and Richard Waldinger Mar. 1982 77 p refs
(Contracts N00014-75-C-0816; N00014-76-C-0687; Grants NSF MCS-78-02591; NSF MCS-79-09495; AF-AFOSR-0014-81)
(AD-A123286; SU-STAN-CS-82-902; AIM-345) Avail: NTIS HC A05/MF A01 CSCL 09/2

Program synthesis is the automated derivation of a computer program from a given specification. In the deductive approach, the synthesis of a program is regarded as a theorem-proving problem; the desired program is constructed as a by-product of the proof. A formal deduction system for program synthesis, with special features for handling equality, the equivalence connective, and ordering relations. In proving theorems involving the equivalence connective, it is awkward to remove all the quantifiers before attempting the proof. The system therefore deals with partially skolemized sentences, in which some of the quantifiers may be left in place. A rule is provided for removing individual quantifiers when required after the proof is under way. The system is also nonclausal; i.e., the theorem does not need to be put into conjunctive normal form. The equivalence, implication, and other connectives may be left intact. Author

N83-23052# Computer Sciences Corp., Falls Church, Va.
SOFTWARE RETEST TECHNIQUES Final Technical Report, Feb. 1981 - Feb. 1982
Kurt Fischer, Farzad Raji, and Daniela Onaszko Griffiss AFB, N.Y. RADC Oct. 1982 144 p refs
(Contract F30602-81-C-0089)
(AD-A123636; RADC-TR-82-275) Avail: NTIS HC A07/MF A01 CSCL 09/2

The purpose of this effort was to study and then develop techniques for maintaining software systems. The report focuses on current maintenance problems, various strategies for retesting, besides an analysis of these strategies. A methodology for retesting was developed that generates the minimum number of test cases to validate a code modification. To generate the minimum number of test cases the methodology analyzes the program data and logic structure dependencies. The selected test cases assure retesting of decision to decision paths (dd-paths) reaching the changed code and setting the changed data reached from the changed code and using the changed data. Author

N83-23053# Young (Arthur) and Co., Washington, D. C.
AN ANALYSIS OF PRIVATE INDUSTRY LOW COST COMPUTING STRATEGIES Final Report, Jun. - Nov. 1982
30 Nov. 1982 70 p
(Contract MDA903-79-C-0690)
(AD-A123641; Rept-0690-013A) Avail: NTIS HC A04/MF A01 CSCL 09/2

Findings and conclusions resulting from a survey of private industries low cost computing strategies are presented. The information provides DoD with background data to be used during the formulation of a DoD management policy for low cost computing. The management and acquisition practices being used by nine large private sector corporations in the area of low cost computing equipment were examined. Author

N83-23054# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Environmental Transport Div.
COMPUTER CODES FOR DISPERSION OF DENSE GAS
Allen H. Weber and James R. Watts Feb. 1982 29 p refs
(Contract DE-AC09-76SR-00001)
(DE82-009918; DP-1580) Avail: NTIS HC A03/MF A01

Two models for describing the behavior of dense gases were adapted for specific applications at the Savannah River Plant and programmed on the IBM computer. One of the models was used to predict the effect of a ruptured H2S storage tank at the 400 area. The other model was used to simulate the effect of an unignited release of H2S from the 400-Area flare tower. DOE

N83-23055# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
IBM CORPORATION IBM 5340 MODEL F37 SYSTEM 34 RELEASE 8
19 Jul. 1982 15 p
(PB83-126334; OSD/FSTC-82-196) Avail: NTIS HC A02/MF A01 CSCL 09B

This FCTC technical report for the IBM Corporation, IBM System 34 COBOL Release 8, Mod. 0(5726-CB1) running unnder the SSP Release 8 (5726-SS1) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Levels 1 and 2 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the descrepancies found - if any. A companion report (Validation Summary Report OSD/FSTC-82/195) provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N83-23056# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
IBM CORPORATION IBM 5340 MODEL F37 SYSTEM 34 RELEASE 8
19 Jul. 1982 52 p
(PB83-126326; OSD/FSTC-82-195) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the IBM Corporation, IBM System 34 COBOL, Release 8 Mod. 0(5726-CB1) running under the IBM System 34 SSP Release 8 (5726-SS1) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-23057# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
SOURCE COBOL FORMATTER (FRMT) USER'S MANUAL
Feb. 1982 33 p
(PB83-117119; OSD/FCTC-82-014; GSA/DF-83/002A) Avail: NTIS HC A03/MF A01 CSCL 09B

The COBOL FRMT is a program that accepts a working COBOL source program and produces a new source program that has been formatted according to the FRMT standards. The benefits of using a source code formatter include having a library of programs that 'look the same' due to consistent indentation and placement of specific clauses and statements. A code formatter can be especially useful in an interactive programming environment where programmers modify programs using interactive terminals. A source code formatter can be used periodically to clean up the format of the code and free the programmer of this task. There are two versions of the COBOL FRMT; one written in the High-Intermediate level of COBOL 68 (X3.23-1968 - FIPS PUB 21) and the other written in High-Intermediate level of COBOL 74 (X3.23-1974 - FIPS PUB 21). The FRMT requires 35K of memory to execute and requires one sequential work file. GRA

N83-23058# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
THE DIGITAL EQUIPMENT CORPORATION VAX-11/750, VAX-11 COBOL VERSION 2.0 Validation Summary Report
10 Jun. 1982 57 p refs
(PB83-128926; OSD/FSTC-82-172) Avail: NTIS HC A04/MF A01 CSCL 09B

The Validation Summary Report (VSR) for the DIGITAL

EQUIPMENT CORPORATION VAX-11 COBOL Version 2.0 running under the VAX/VMSA Version 3.0 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-23059# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
IBM CORPORATION IBM 5381 MODEL 5 COBOL 5714-CB1 RELEASE 4 Validation Summary Report
20 Jul. 1982 51 p
(PB83-126342; OSD/FSTC-82-197) Avail: NTIS HC A04/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the IBM Corporation SYSTEM/38 COBOL Release 4 (5714-CB1) running under the SYSTEM/38 CPF Release 4 (5714-SS1) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the Low-Intermediate level of FIPS PUB 21.1. The VSR is made up of several sections showing all the discrepancies found - if any. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of descrepancies together with the tests which failed. GRA

N83-23060# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
NEC INFORMATION SYSTEMS, INC. ASTRA-270-200, COBOL 74 REVISION 0424
4 Jun. 1982 91 p
(PB83-128876; OSD/FSTC-82-135) Avail: NTIS HC A05/MF A01 CSCL 09B

This Validation Summary Report (VSR) for the NEC Information Systems, Inc., COBOL 74 Revision 0424 running under the ASTRA OS Release 4.24 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated against the High-Intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing all the descrepancies found - if any. These include an overview of the validation which lists all categories of descrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal Levels of the language, and a detailed listing of discrepancies together with the tests which failed. GRA

N83-23061# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
IBM CORPORATION IBM 5381 MODEL 5 COBOL 5714-CB1 RELEASE 4
20 Jul. 1982 16 p
(PB83-126359; OSD/FSTC-82-198) Avail: NTIS HC A02/MF A01 CSCL 09B

This FCTC Technical Report for the IBM Corporation, SYSTEM/38 COBOL, Release 4 (5714-CB1) running under the SYSTEM/38 CPF, Release 4(5714-SS1) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O, Levels 1 and 2 of the 1974 COBOL standard (X3.23-1974/FIPS PUB21-1). This technical report is made up of several sections showing all the discrepancies found - if any. Any companion report Validation Summary Report OSD/FSTC-82/197 provides information regarding the validation of the compiler as the Low-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N83-23062# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
THE FORTRAN 77 ANALYZER USER'S MANUAL
Jul. 1982 130 p refs
(PB83-117101; OSD/FCTC-82-017; GSA/DF-83/003A) Avail: NTIS HC A07/MF a01 CSCL 09B

The FORTRAN 77 ANALYZER evaluates the structure of a FORTRAN program both statically, based on the source code and dynamically during execution of the compiled program. The reports produced by the system are as follows: statistical summary of statement and segment information at both the routine and program level; program call tree giving hierarchical display of inter-module references; segment utilization at the program level; assertion utilization at the program level; source program listing annotated with segment and assertion execution information; distribution of statement by type with static frequencies at both the routine and program levels; distribution of statements by type with dynamic execution frequencies at both the routine and program levels; invocation frequency of all routines contained within the program; percent of segment execution coverage; and percent of statement execution coverage. GRA

N83-23063# Federal Compiler Testing Center, Falls Church, Va. Office of Software Development.
NEC INFORMATION SYSTEMS, INC., ASTRA-270-200, COBOL 74 REVISION 0424 (COBOL TECHNICAL REPORT)
4 Jun. 1982 13 p
(PB83-128884; OSD/FSTC-82-136) Avail: NTIS HC A02/MF A01 CSCL 09B

This FCTC technical report for NEC Information Systems, Inc., COBOL 74 Revision 0424 running under the ASTRA OS Release 4.24 provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O, Level 1 of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This technical report is made up of several sections showing all the descrepancies found - if any. A companion report Validation Summary Report OSD/FSTC-82/135 provides information regarding the validation of the compiler as the High-Intermediate level of Federal Standard COBOL (FIPS PUB 21-1). GRA

N83-22104# Royal Aircraft Establishment, Farnborough (England) Flight Systems Dept.
A MODULAR APPROACH TO HIGH RELIABILITY SOFTWARE GENERATION WITH APPLICATION TO NONLINEAR CONTROL
S. M. Wright and J. S. Winter *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 11 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22106# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Dynamics Div.
ON VALIDATION OF MISSION-SOFTWARE BY CLOSED-LOOP TESTING IN REALTIME
Hermann Neubauer *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 15 p (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22107# Dowty Electronics Ltd., London (England).
BUILDING IN INTEGRITY TO A HIGHER ORDER LANGUAGE
N. J. B. Young *In* AGARD Advan. in Guidance and Control Systems Jan. 1983 10 p refs (For primary document see N83-22093 12-01)
Avail: NTIS HC A11/MF A01

N83-22114# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmnsbereich.
SOFTWARE DEVELOPMENT: DESIGN AND REALITY
H. vonGroote and F. Schwegler *In* AGARD Software for Avionics Jan. 1983 10 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22115# British Aerospace Dynamics Group, Stevenage (England).
MASCOT DEVELOPMENTS TO IMPROVE SOFTWARE STRUCTURE AND INTEGRITY
H. R. Simpson *In* AGARD Software for Avionics Jan. 1983 14 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22117# Marconi Avionics Ltd., Boreham Wood (England).
REQUIREMENTS DECOMPOSITION AND OTHER MYTHS
T. G. Swann *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22118# British Aerospace Aircraft Group, Warton (England).
PRACTICAL CONSIDERATIONS IN THE INTRODUCTION OF REQUIREMENTS ANALYSIS TECHNIQUE
C. P. Price and D. Y. Forsyth *In* AGARD Software for Avionics Jan. 1983 12 p ref Sponsored in part by RAE (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22120# Marconi Avionics Ltd., Boreham Wood (England).
THE MENTOR APPROACH TO REQUIREMENTS SPECIFICATION
D. Jordan and B. Hauxwell *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-61)
Avail: NTIS HC A19/MF A01

N83-22121# Mathematischer Beratungs- und Programmierungsdienst G.m.b.H. Dortmund (West Germany).
THE COMPUTER AIDED SPECIFICATION SYSTEM EASY
Lutz Hirschmann and Niels Christensen *In* AGARD Software for Avionics Jan. 1983 12 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22122# General Dynamics Corp., Fort Worth, Tex.
THE IMPACT OF STANDARDIZATION ON AVIONIC SOFTWARE
J. D. Engelland *In* AGARD Software for Avionics Jan. 1983 6 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22123# Ada Joint Program Office, Arlington, Va.
ADA STATUS AND OUTLOOK
John F. Kramer, Jr. *In* AGARD Software for Avionics Jan. 1983 6 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22124# Ministry of Defence, Paris (France).
D-12 STANDARDIZING LTR FOR ONBOARD COMPUTERS: THE PRESENT AND THE FUTURE [STANDARDISATION DU LTR POUR CALCULATEURS EMBARQUES]
Ica deMontcheuil *In* AGARD Software for Avionics Jan. 1983 10 p In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22125# Naval Weapons Center, China Lake, Calif.
OPERATIONAL FLIGHT PROGRAM DEVELOPMENT WITH A HIGHER ORDER LANGUAGE
R. E. Westbrook and L. L. Crews *In* AGARD Software for Avionics Jan. 1983 4 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22126# Marconi Avionics Ltd., Boreham Wood (England).
THE USE OF HIGH ORDER LANGUAGES ON MICROPROCESSORS
R. M. Boardman *In* AGARD Software for Avionics Jan. 1983 5 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22127# Ferranti Computer Systems Ltd., Gwent (England).
SOFTWARE DESIGN AND DEVELOPMENT USING MASCOT
R. Dibble *In* AGARD Software for Avionics Jan. 1983 15 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22130# Kongsberg Vapenfabrikk A/S (Norway).
SOFTWARE CONFIGURATION MANAGEMENT AT WORK
Jan Tore Pedersen *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22131# Marconi Avionics Ltd., Boreham Wood (England).
CONFIGURATION MANAGEMENT AND THE ADA PROGRAMMING SUPPORT ENVIRONMENT
Kevin J. Pulford *In* AGARD Software for Avionics Jan. 1983 10 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22132*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOFTWARE FAULT TOLERANCE FOR REAL-TIME AVIONICS SYSTEMS
T. Anderson (Newcastle upon Tyne Univ.) and J. C. Knight *In* AGARD Software for Avionics Jan. 1983 6 p refs (For primary document see N83-22112 12-01)
(Contracts NAS1-14101; NAS1-14472)
Avail: NTIS HC A19/MF A01 CSCL 09B

N83-22133# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELECTRONIC WARFARE SOFTWARE
Rudy L. Shaw *In* AGARD Software for Avionics Jan. 1983 5 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22134# Marconi Avionics Ltd., Boreham Wood (England).
AN EIGHT POINT TESTING STRATEGY FOR REAL TIME SOFTWARE
R. E. Wilson and N. Higson *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22135# Aeritalia S.p.A., Caselle Torinese (Italy). Gruppo Sistemi Avionici ed Equipaggiamenti.
TORNADO FLIGHT CONTROL SOFTWARE VALIDATION: METHODOLOGY AND TOOLS
Roberto Pelissero *In* AGARD Software for Avionics Jan. 1983 13 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22136# Tracor, Inc., Warminster, Pa.
APPLICATIONS OF NETWORK MODELING AND ANALYSIS TO SYSTEM VALIDATION AND VERIFICATION
Gary M. Sundberg *In* AGARD Software for Avionics Jan. 1983 11 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22137# Electronique Serge Dassault, St. Cloud (France).
IDA: SOFTWARE TEST LANGUAGE AND RELATED TOOLS [IDA: LANGUAGE DE TEST DU LOGICIEL ET OUTILS ASSOCIES.]
G. Lamarche and P. Taillibert *In* AGARD Software for Avionics Jan. 1983 15 p refs In FRENCH (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22138# Litton Technische Werke, Freiburg (West Germany).
SOFTWARE VERIFICATION OF A CIVIL AVIONIC AHR SYSTEM
Michael Kleinschmidt and Norbert Sandner *In* AGARD Software for Avionics Jan. 1983 9 p refs (For primary document see

N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22139# Aerospace Corp., Los Angeles, Calif. Information Sciences Research Office.
PROGRESS IN VERIFICATION OF MICROPROGRAMS
Stephen D. Crocker *In* AGARD Software for Avionics Jan. 1983 4 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22140# Naval Weapons Center, China Lake, Calif.
VALIDATION OF SOFTWARE FOR INTEGRATION OF MISSILES WITH AIRCRAFT SYSTEMS
J. R. McManis *In* AGARD Software for Avionics Jan. 1983 6 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22141# Ferranti Computer Systems Ltd., Gwent (England).
IMPLEMENTING HIGH QUALITY SOFTWARE
E. J. Dowling *In* AGARD Software for Avionics Jan. 1983 14 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22145# McDonnell Aircraft Co., St. Louis, Mo.
F/A-18 SOFTWARE DEVELOPMENT: A CASE STUDY
T. V. McTigue *In* AGARD Software for Avionics Jan. 1983 15 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A01/MF A01

N83-22148# National Aerospace Lab., Amsterdam (Netherlands).
A SOFTWARE-COST DATABASE FOR AEROSPACE SOFTWARE DEVELOPMENT
G. J. Dekker *In* AGARD Software for Avionics Jan. 1983 8 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22150# British Aerospace Aircraft Group, Woodford (England).
DESIGN OF A SOFTWARE MAINTENANCE FACILITY FOR THE RAF
John Whailey and Timothy H. Scott-Wilson *In* AGARD Software for Avionics Jan. 1983 10 p refs Sponsored in part by the U.K. Ministry of Defence (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22151# Naval Air Development Center, Warminster, Pa. Software and Computer Directorate.
A SOFTWARE ENGINEERING ENVIRONMENT (SEE) FOR WEAPON SYSTEM SOFTWARE
H. G. Stuebing *In* AGARD Software for Avionics Jan. 1983 16 p refs (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-22152# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
ON AIRCRAFT TEST SOFTWARE FOR FIRST LINE MAINTENANCE
H. Klenk *In* AGARD Software for Avionics Jan. 1983 8 p (For primary document see N83-22112 12-01)
Avail: NTIS HC A19/MF A01

N83-23008# La Trobe Univ., Melbourne (Australia). Dept. of Mathematics.
TECHNIQUES FOR CONSTRAINED OPTIMIZATION
B. Mond *In* NRIMS Symp. on Control Theory and Appl. 1982 11 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23013# Gold Fields of South Africa Ltd., Johannesburg.
STABILIZATION AND OPTIMIZATION CONTROL OF A CONCENTRATOR WITH SPECIAL REFERENCE TO THE CONTROL STRATEGIES USED AT THE BLACK MOUNTAIN MINE
P. Nienaber *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23021# Pretoria Univ. (South Africa). Dept. of Electronic Engineering.
ACCURACY LIMITS ON DIGITAL SIMULATION OF CONTINUOUS SYSTEMS
O. H. Rubin *In* NRIMS Symp. on Control Theory and Appl. 1982 12 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23022# Electronic Associates, Inc., Long Branch, N.J.
A SURVEY OF HYBRID COMPUTER USES IN CONTROL SYSTEM DESIGN
Ronald M. Maslo *In* NRIMS Symp. on Control Theory and Appl. 1982 24 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23023# Witwatersrand Univ., Johannesburg (South Africa). Dept. of Electrical Engineering.
IMPLEMENTATION OF THE THREE-TERM CONTROL ALGORITHM IN SMALL COMPUTERS
I. M. MacLeod *In* NRIMS Symp. on Control Theory and Appl. 1982 13 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23024# Pretoria Univ. (South Africa). Dept. of Applied Mathematics.
THE DEVELOPMENT OF A CONVERGENT ALGORITHM FOR LARGE UNCONSTRAINED MINIMIZATION PROBLEMS
J. A. Snyman *In* NRIMS Symp. on Control Theory and Appl. 1982 14 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N83-23064# California Univ., Berkeley. Lawrence Berkeley Lab. Computer Science and Mathematics Dept.
DCN/SEEDIS, THE DISTRIBUTED COMPUTER NETWORK (DCN) AND SOCIO-ECONOMIC-ENVIRONMENTAL DEMOGRAPHIC INFORMATION SYSTEM (SEEDIS) Annual Report FY 1981 to the Employment and Training Administration US Department of Labor
Jun. 1982 43 p
(Contract DE-AC03-76SF-00098)
(DE83-000945; LBL-14713) Avail: NTIS HC A03/MF A01

DCN/SEEDIS is a project which addresses both short term and long term computing needs of the Employment and Training Administration of the Department of Labor. Broadly speaking, the DCN addresses the short term and operational needs of ETA, while SEEDIS addresses longer term needs and directions. Both portions are based on the premise that fundamental changes are required in the way computing is done, if it is to respond adequately to user needs. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N83-23065*# Texas A&M Univ., College Station. Dept. of Mathematics.
PROCEEDINGS OF THE NASA/MPRIA WORKSHOP: MATH/STAT Progress Report
L. F. Guseman, Jr. 1983 183 p refs Workshop held in College Station, Tex., 27-28 Jan. 1983
(Contract NAS9-16664)
(NASA-CR-167839; NAS 1.26:167839) Avail: NTIS HC A09/MF A01 CSCL 09B

Research proposals in mathematical pattern recognition and

image analysis are presented. For individual titles, see N83-23066 through N83-23072.

N83-23066*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ESTIMATING PROPORTIONS OF MATERIALS USING MIXTURE MODELS
Richard P. Heydorn and Rekha Basu *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 7-36 refs (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

An approach to proportion estimation based on the notion of a mixture model, appropriate parametric forms for a mixture model that appears to fit observed remotely sensed data, methods for estimating the parameters in these models, methods for labelling proportion determination from the mixture model, and methods which use the mixture model estimates as auxiliary variable values in some proportion estimation schemes are addressed. Author

N83-23067*# Rice Univ., Houston, Tex.
NONPARAMETRIC PROBABILITY DENSITY ESTIMATION FOR DATA ANALYSIS IN SEVERAL DIMENSIONS
David W. Scott *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 37-48 refs (For primary document see N83-23065 12-63)
(Contract DAAG29-82-K-0014)
Avail: NTIS HC A09/MF A01 CSCL 09B

Nonparametric probability density estimates, in particular the corresponding contour curves, it is shown, are a useful adjunct to scatter diagrams when performing a preliminary examination of a set of random data in several dimensions. Author

N83-23068*# Texas A&M Univ., College Station. Inst. of Statistics.
FUNSTAT AND STATISTICAL IMAGE REPRESENTATIONS
Emanuel Parzen *In its* Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 65-76 (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

General ideas of functional statistical inference analysis of one sample and two samples, univariate and bivariate are outlined. ONESAM program is applied to analyze the univariate probability distributions of multi-spectral image data. Author

N83-23069*# Texas Univ., Austin.
A MINIMAX APPROACH TO SPATIAL ESTIMATION USING AFFINITY MATRICES
Carl N. Morris *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 101-108 ref (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

Estimates made in the plane to improve on noisy unbiased estimates were combined. Only a small fraction of points in a giant grid were used to do this, those that are most like a given point. A component of this process defining an affinity matrix of values, indicating which points are relevant to others. Minimax rules are shown to be based on affinity matrices. Author

N83-23070*# Texas Univ., Austin. Dept. of Mathematics.
LOCALIZED SHRINKAGE FACTORS AND MINIMAX RESULTS
Hubert Kostal *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 109-114 (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

A condition is derived under which a localized shrinkage factor estimator will be minimax. A specific localized shrinkage factor estimator is described. The nonapplicability of the derived condition to some estimators is shown. Several comments concerning these results are made. Author

N83-23071*# Houston Univ., Tex. Dept. of Mathematics.
COVARIANCE HYPOTHESES FOR LANDSAT DATA
Henry P. Decell and Charles Peters *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 125-133 (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

Two covariance hypotheses are considered for LANDSAT data acquired by sampling fields, one an autoregressive covariance structure and the other the hypothesis of exchangeability. A minimum entropy approximation of the first structure by the second is derived and shown to have desirable properties for incorporation into a mixture density estimation procedure. Results of a rough test of the exchangeability hypothesis are presented. Author

N83-23072*# Texas A&M Univ., College Station.
FUNDAMENTAL RESEARCH DATA BASE
In its Proc. of the NASA/MPRIA Workshop: MATH/STAT 1983 p 173-191 (For primary document see N83-23065 12-63)
Avail: NTIS HC A09/MF A01 CSCL 09B

A fundamental research data base was created on a single 9-track 1600 BPI tape containing ground truth, image, and Badhwar profile feature data for 17 North Dakota, South Dakota, and Minnesota agricultural sites. Each site is 5x6 nm in area. Image data has been provided for a minimum of four acquisition dates for each site. All four images have been registered to one another. A list of the order of the files on tape and the dates of acquisition is provided. Author

N83-23073*# Texas A&M Univ., College Station. Dept. of Mathematics.
PROCEEDINGS OF THE NASA/MPRIA WORKSHOP: PATTERN RECOGNITION Progress Report
L. F. Guseman, Jr. 1983 237 p refs Workshop held in College Station, Tex., 3-4 Feb. 1983
(Contract NAS9-16664)
(NASA-CR-167840; NAS 1.26:167840) Avail: NTIS HC A11/MF A01 CSCL 09B

Outlines of talks presented at the workshop conducted at Texas A & M University on February 3 and 4, 1983 are presented. Emphasis was given to the application of Mathematics to image processing and pattern recognition. For individual titles, see N83-23074 through N83-23082.

N83-23074*# Kansas Univ., Lawrence. Dept. of Electrical Engineering.
TEXTURAL EDGE DETECTION AND SENSITIVITY ANALYSIS
K. Sam Shanmugan *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 7-26 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

An optimum (global) textural edge detection operator based on statistical models for texture was developed. Also the effects of the imaging process on the textural patterns of a scene as it appears in the image were analyzed. L.F.M.

N83-23075*# Kansas Univ., Lawrence. Remote Sensing Lab.
THE INFLUENCE OF SENSOR AND FLIGHT PARAMETERS ON TEXTURE IN RADAR IMAGES
V. S. Frost, K. Sam Shanmugan, and J. C. Holtzman *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 27-58 refs (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

Texture is known to be important in the analysis of radar images for geologic applications. It has previously been shown that texture features derived from the grey level co-occurrence matrix (GLCM) can be used to separate large scale texture in radar images. Here the influence of sensor parameters, specifically the spatial and radiometric resolution and flight parameters, i.e., the orientation of the surface structure relative to the sensor, on the ability to classify texture based on the GLCM features is investigated. It was found that changing these sensor and flight parameters greatly affects the usefulness of the GLCM for classifying texture on radar images. Author

N83-23076*# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
ASPECTS OF SIMULATION FOR RECTIFICATION STUDIES
E. M. Mikhail and Fidel D. Paderes, Jr. *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 59-72 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

The use of mathematical models and simulation is suggested as an aid to rectification. An outline of the factors affecting rectification accuracy is presented along with methods and approaches used for rectifications. L.F.M.

N83-23077*# Maryland Univ., College Park. Computer Vision Lab.
IMAGE MATCHING USING HOUGH TRANSFORMS
Larry S. Davis and Azriel Rosenfeld *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 73-108 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

Image matching using Hough transforms is discussed. Known objects in imagery are used as input to the transforms which allow prediction of similar objects in the imagery. L.F.M.

N83-23078*# L N K Corp., Inc., Silver Spring, Md.
SUBPIXEL REGISTRATION ACCURACY AND MODELLING
Laveen N. Kanal *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 109-158 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

An outline of methods for subpixel registration accuracy and modelling is presented. Consideration of the following questions is emphasized: how accurately can a LANDSAT image be registered to a reference image, how can subpixel accuracy be achieved, what factors affect registration accuracy, how should reference images be formed, and how can various algorithms be evaluated. L.F.M.

N83-23079*# Hunter Coll., New York.
IMPROVING SPATIAL MODELLING IN REMOTE SENSING
A. H. Strahler (California Univ., Santa Barbara), C. E. Woodcock, R. Irish, and W. R. Tobler *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 159-186 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

Approaches to improving spatial modelling for remote sensing are presented. Examples of variograms of various scenes are shown. L.F.M.

N83-23080*# SRI International Corp., Menlo Park, Calif.
APPROACHES TO IMAGE REGISTRATION AND SEGMENTATION
Grahame Smith *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

An outline of various approches to image registration and segmentation is presented. Emphasis is given to mathematical techniques. L.F.M.

N83-23081*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
PROGRESS IN THE SCENE-TO-MAP REGISTRATION TASK
David D. Dow *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 207-222 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

An assessment of geometric accuracy of scene to map registration of LANDSAT MSS and TM sensor products is made. An outline of improved procedures for the registration and rectification of LANDSAT data is presented. L.F.M.

N83-23082*# Texas A&M Univ., College Station.
FUNDAMENTAL RESEARCH DATA BASE
In its Proc. of the NASA/MPRIA Workshop: Pattern Recognition 1983 p 225-243 (For primary document see N83-23073 12-63)
Avail: NTIS HC A11/MF A01 CSCL 09B

A fundamental research data base containing ground truth, image, and Badhwar profile feature data for 17 North Dakota, South Dakota, and Minnesota agricultural sites is described. Image data was provided for a minimum of four acquisition dates for each site and all four images were registered to one another. L.F.M.

N83-23083# Army Science Board, Washington, D.C.
ARTIFICIAL INTELLIGENCE AND ROBOTICS Final Report
Irene C. Peden, Joseph V. Braddock, William Brown, Richard M. Langendorf, and Stephen W. Leibholz 20 Sep. 1982 43 p (AD-A122414) Avail: NTIS HC A03/MF A01 CSCL 15/3

This report examines the state-of-the-art in artificial intelligence and robotics technologies and their potential in terms of Army needs. Assessment includes battlefield technology, research and technology insertions, management considerations and recommendations related to research and development personnel, and recommendations regarding the Army's involvement in the automated plant. Author (GRA)

N83-23009# Institute for Maritime Technology, Simonstown (South Africa).
A SURVEY OF CLASSES OF METHODS FOR THE ITERATIVE SOLUTION OF OPTIMAL CONTROL PROBLEMS
D. M. Murray *In* NRIMS Symp. on Control Theory and Appl. 1982 25 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23010# Pretoria Univ. (South Africa). Dept. of Electronic Engineering.
DESIGN OF FEEDBACK CONTROL SYSTEMS
O. H. Rubin *In* NRIMS Symp. on Control Theory and Appl. 1982 11 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23017# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
ADVANCES IN MODEL FOLLOWING ADAPTIVE CONTROL THEORY
S. G. McLaren and A. P. Hathorn *In its* Symp. on Control Theory and Appl. 1982 18 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23018# Witwatersrand Univ., Johannesburg (South Africa). Dept. of Electrical Engineering.
A NON-PARAMETRIC SELF-TUNING CONTROLLER
M. A. Heilbrunn (Council for Mineral Technol.) and I. J. Barker (Council for Mineral Technol.) *In* NRIMS Symp. on Control Theory and Appl. 1982 14 p refs In ENGLISH; AFRIKAANS summary (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N83-23084*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PSEUDO-RANDOM NUMBER GENERATOR FOR THE SIGMA 5 COMPUTER
Stanley N. Carroll Feb. 1983 17 p refs
(NASA-TM-82516; NAS 1.15:82516) Avail: NTIS HC A02/MF A01 CSCL 12A

A technique is presented for developing a pseudo-random number generator based on the linear congruential form. The two numbers used for the generator are a prime number and a corresponding primitive root, where the prime is the largest prime

number that can be accurately represented on a particular computer. The primitive root is selected by applying Marsaglia's lattice test. The technique presented was applied to write a random number program for the Sigma 5 computer. The new program, named S:RANDOM1, is judged to be superior to the older program named S:RANDOM. For applications requiring several independent random number generators, a table is included showing several acceptable primitive roots. The technique and programs described can be applied to any computer having word length different from that of the Sigma 5. Author

N83-23085*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPLICIT TOTAL VARIATION DIMINISHING (TVD) SCHEMES FOR STEADY-STATE CALCULATIONS
H. C. Yee, R. F. Warming, and A. Harten (Tel-Aviv Univ.) Mar. 1983 57 p refs
(NASA-TM-84342; A-8952; NAS 1.15:84342) Avail: NTIS HC A04/MF A01 CSCL 12A

The application of a new implicit unconditionally stable high resolution total variation diminishing (TVD) scheme to steady state calculations. It is a member of a one parameter family of explicit and implicit second order accurate schemes developed by Harten for the computation of weak solutions of hyperbolic conservation laws. This scheme is guaranteed not to generate spurious oscillations for a nonlinear scalar equation and a constant coefficient system. Numerical experiments show that this scheme not only has a rapid convergence rate, but also generates a highly resolved approximation to the steady state solution. A detailed implementation of the implicit scheme for the one and two dimensional compressible inviscid equations of gas dynamics is presented. Some numerical computations of one and two dimensional fluid flows containing shocks demonstrate the efficiency and accuracy of this new scheme. Author

N83-23086# Orange Free State Univ., Bloemfontein (South Africa). Dept. of Mathematical Statistics.
QUADRATIC FORMS OF A MATRIC-t VARIATE
D. G. Marx May 1982 11 p refs Sponsored in part by CSIR
(TR-79) Avail: NTIS HC A02/MF A01

Crowther studied the distribution of a quadratic form in a matrix normal variate. This, in some sense, is extended by De Waal. They represented the density function of this quadratic form in terms of generalized Hayakawa polynomials. Application of some specific results of these authors facilitates the derivation of distributions of quadratic forms of the matric-t variate. Attention is also given to the distributions of the characteristic roots and the trace of this quadratic matrix. Special cases are considered and some useful integrals are formulated. M.G.

N83-23087# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
THE FINITE ANALYTIC METHOD, VOLUME 3 Final Report
Ching-Jen Chen, Mohamad Zahed Sheikholeslami, Bahram Khalighi, and Kanwerdip Singh Aug. 1981 391 p refs 5 Vol.
(Grant NsG-3305)
(NASA-CR-170186; NAS 1.26:10186; IIHR-232-III-Vol-3) Avail: NTIS HC A17/MF A01 CSCL 12A

The finite analytic (FA) method is applied to the numerical solution of two-point boundary value problems of ordinary differential equation. Convergence, stability, and accuracy of the method are examined and a comparison of the finite analytic solution with solutions obtained from the finite difference method is given for several numerical examples. In addition, the FA method is used to solve the two-dimensional Poisson and Laplace equations. Finally a general 9-point finite analytic formula is developed for the Navier-Stokes equation in a finite element. The Navier-Stokes equations are formulated using the primitive variables. An iterative scheme which solves the continuity equation, Poisson pressure equation and the momentum equations for the three primitive variables is devised. The FA numerical solution is first obtained for stagnation point flow and a comparison with the exact solution is made. Then the formula is used to obtain the numerical solution for a flat plate-wake combined problem and also for a square driven cavity flow. The results are obtained for Reynolds numbers 100, 400, and 800. M.G.

N83-23088# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
THE FINITE ANALYTIC METHOD, VOLUME 4 Final Report
Ching-Jen Chen and Hamn-Ching Chen Aug. 1982 424 p refs 5 Vol.
(Grant NsG-3305)
(NASA-CR-170187; NAS 1.26:170187; IIHR-232-IV-Vol-4) Avail: NTIS HC A18/MF A01 CSCL 12A

Unsteady 1D, 2D, and 3D incompressible Navier-Stokes equations are numerically analyzed by a numerical scheme called the finite analytic method. The basic idea of the finite analytic method is the incorporation of a local analytic solution in the numerical solution of linear and nonlinear partial differential equations. The local analytic solutions for unsteady 1D, 2D and 3D convective transport equations are obtained from locally linearized governing equations by specifying suitable initial and boundary conditions for each local element. When the local analytic solution is evaluated at a given nodal point, it gives an analytic algebraic relationship between a nodal value in a local element to its neighboring nodal points. The solution of the problem is then achieved by solving the system of algebraic equations. Depending on the boundary and initial functions chosen to represent the boundary and initial conditions for each local element, a number of local analytic solutions are derived. The results show that the boundary approximation based on the combination of exponential and linear function is the best one since the boundary function thus constructed is the natural solution of the governing equation. The finite analytic coefficients thus obtained are shown to be relatively simple and do give the correct asymptotic behavior for both diffusion and convection dominated cases. M.G.

N83-23089# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
THE FINITE ANALYTIC METHOD, VOLUME 5 Final Report
Ching-Jen Chen, Kuo-San Ho, and Wu-Sun Cheng Oct. 1982 438 p refs 5 Vol.
(Grant NsG-3305)
(NASA-CR-170188; NAS 1.26:170188; IIHR-232-V-Vol-5) Avail: NTIS HC A19/MF A01 CSCL 12A

In order to solve practical engineering problems, a finite analytic (FA) method capable of solving flow and heat transfer problems involving complex geometries is developed. The boundary-fitted coordinate transformation is incorporated into the FA method. The FA method is employed to solve several flow and heat transfer problems. The problem of convective heat transfer in a cavity is studied with the Reynolds number ranging from 100 to 2,000 and the Peclet number ranging from 10 to 20,000 by using an equal size grid in the physical plane. The separation of channel flow is examined at different Reynolds numbers over the range 25 to 229 with both equal and unequal size grids in the physical plane. For problems with complex geometries, flow past an airfoil and convective heat transfer in tube bundles, both are solved with the FA method for the boundary-fitted coordinate system. The FA results are compared with the experimental data, the theoretical calculation, and predictions by other numerical schemes. In additioin, the FA numerical solution for two dimensional incompressible flows over an arbitrary body shape is discussed. M.G.

N83-23090# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
A NATURAL COORDINATE SYSTEM FOR NONLINEAR SYSTEMS
Renjeng Su and L. R. Hunt [1982] 9 p refs
Avail: NTIS HC A02/MF A01

A natural coordinate system for nonlinear systems of the form (dot)x = f(x) + g(x)u where x is an element of R(n), u is an element of R, and f and g are analytic, vector-valued functions on R(n) is discussed. It is shown that in these coordinates the equation becomes a system with only feedback paths (no feedforwards), if feedback linearizability conditions are satisfied. M.G.

N83-23091# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ACTIVITIES IN SPACE SCIENCE INVOLVING APPLIED MATHEMATICS [TRABALHOS EM CIENCIA ESPACIAL NO INSTITUTO DE PESQUISAS ESPACIAIS (INPE) QUE ENVOLVEM MATEMATICA APLICADA]
Ivan Jelinek Kantor Mar. 1983 11 p refs In PORTUGUESE; ENGLISH summary Sponsored in part by the National Fund for Scientific and Technological Development
(INPE-2659-PRE/271) Avail: NTIS HC A02/MF A01

Some of the researches in the Geophysics and Aeronomy Department at the Brazilian Institute for Space Research involving Applied Mathematics are: (a) minor atmospheric constituents modelling by finite differences; (b) terrestrial conductivity through magnetotelluric methods inversion methods; (c) simulation of the dynamics of ionospheric bubble involving a system of elliptic and parabolic type equations, using the FCT and SOR methods; (d) simulation of the electrodynamics of the E and F regions involving a coupled system of partial differential equations of the elliptic and parabolic type; (e) modelling of the atmospheric electric field that involves a partial differential equation of the elliptic type. In this last case the finite difference methods (SOR and BTM) and finite elements (EF-Galerkin) have been utilized. The SOR method proved inadequate in the cases (d) and (e). Author

N83-23092# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
CONVERGENCE RESULTS FOR CONTINUOUS-TIME ADAPTIVE STOCHASTIC FILTERING ALGORITHMS
J. H. vanSchuppen Dec. 1982 23 p refs Submitted for publication
(MC-BW-176/82) Avail: NTIS HC A02/MF A01

The adaptive stochastic filtering problem for Gaussian processes is considered. The selftuning synthesis procedure is used to derive two algorithms for this problem. Almost sure convergence for the parameter estimate and the filtering error is established. The convergence analysis is based on the almost-supermartingale convergence lemma that allows a stochastic Lyapunov like approach. M.G.

N83-23093# Rome Air Development Center, Griffiss AFB, N.Y.
FAULT DETECTION/ISOLATION VERIFICATION
William T. Etter, Robert A. Meyer, and David E. Krzysiak Aug. 1982 46 p
(AF Proj. 2155)
(AD-A122418; RADC-TR-82-232) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report documents an in-house program to test and evaluate the Fault Detection and Isolation Algorithm developed. Testing of the fault isolation capability required extensive use of the accompanying emulation facility. Several network connectivities were simulated. These included a Highly Interconnected Network, Dumbell Structured Network, Loop Network and a Backhauling Network. To test the performance of the algorithm on these networks, several different fault scenarios were designed for each network. Each scenario would take advantage of the connectivity particular to each network. The results of the testing show that the algorithm is able to correctly identify the location of a fault to the equipment level under a wide range of conditions. It is noted, however, that the time required to find these faults varies considerably with network connectivity. Based upon the test results detailed in this report, it is recommended that although the algorithm should be kept functionally the same, it should be rewritten to correct various deficiencies (such as execution time varying greatly with connectivity). GRA

N83-23094# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
ASYMPTOTIC AND NUMERICAL METHODS FOR VECTOR SYSTEMS OF SINGULARLY-PERTURBED BOUNDARY VALUE PROBLEMS Final Report
Joseph E. Flaherty and Robert E. OMalley, Jr. Oct. 1982 24 p refs
(DA Proj. 1L1-61101-A-91-A)
(AD-A122293; AD-E440170; ARLCB-TR-82031) Avail: NTIS HC A02/MF A01 CSCL 12/1

Procedures are developed for constructing asymptotic solutions for certain nonlinear singularly-perturbed vector two-point boundary value problems having boundary layers at one or both end points. The asymptotic approximations are generated numerically and can either be used as is or to furnish a two-point boundary value code (e.g., COLSYS) with an initial approximation and a nonuniform computational mesh. The procedures are applied to several examples involving the deformation of nonlinear elastic beams. GRA

N83-23095# Army Missile Command, Redstone Arsenal, Ala. Systems Simulation and Development Directorate.
AN APPROXIMATION FOR Z(G(s)F(s) VIA THE SECOND MEAN VALUE THEOREM OF THE INTEGRAL CALCULUS: THE DIGITAL SIMULATION OF CONTINUOUS LINEAR SYSTEMS VIA Z-TRANSFORMS
Richard E. Dickson Nov. 1982 6 p refs
(AD-A122255; AD-E950322; DRSMI/RD-82-16-TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report presents the approximation for Z(G(s)F(s)), which is based upon the second mean value theorem of the integral calculus. Author (GRA)

N83-23096# Harvard Univ., Cambridge, Mass. Computation Lab.
A LOGARITHMIC TIME SORT FOR LINEAR SIZE NETWORKS
John H. Reif and Leslie G. Valiant Nov. 1982 28 p refs
(Contract N00014-80-C-0674)
(AD-A122659; TR-36-82) Avail: NTIS HC A03/MF A01 CSCL 12/1

We give a randomized algorithm that sorts on an N node network with constant valence in O (log N) time. More particularly the algorithm sorts N items on an N code cube-connected cycles graph and for some constant k for all large enough alpha it terminates within K alpha log N time with probability at least 1-n/alpha. GRA

N83-23097# Maryland Univ., College Park. Dept. of Physics and Astronomy.
GRAPHICAL ANALYSES OF CONNECTED-KERNEL SCATTERING EQUATIONS
A. Picklesimer Oct. 1982 15 p refs
(Contract DE-AS05-76ER-05126)
(DE83-002605; DOE/ER-05126/173; ORO-5126-173) Avail: NTIS HC A02/MF A01

Simple graphical techniques are employed to obtain a new (simultaneous) derivation of a large class of connected-kernel scattering equations. This class includes the Rosenberg, Benczer-Redish-Sloan, and connected-kernel multiple scattering equations as well as a host of generalizations of these and other equations. The graphical method also leads to a simplified form for some members of the class and elucidates the general structural features of the entire class. DOE

N83-23098# Bendix Corp., Kansas City, Mo.
A METHOD TO APPROXIMATE A TRANSFER FUNCTION
L. L. Dixon Nov. 1982 29 p
(Contract DE-AC04-76DP-00613)
(DE83-004166; BDX-613-2841) Avail: NTIS HC A03/MF A01

A transfer function processes input data and obtains output information. The AITRAC routine requires the coefficients of the Laplace transform written as a rational polynomial. This report describes how to approximate these coefficients by using a known input function along with its resulting output data. DOE

N83-23099# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
MONOTONE BOOLEAN APPROXIMATION
Bernie L. Hulme Dec. 1982 15 p refs
(Contract DE-AC04-76DP-00789)

(DE83-004764; SAND-82-2357) Avail: NTIS HC A02/MF A01

This report presents a theory of approximation of arbitrary Boolean functions by simpler, monotone functions. Monotone increasing functions can be expressed without the use of complements. Nonconstant monotone increasing functions are important in their own right since they model a special class of systems known as coherent systems. It is shown here that when Boolean expressions for noncoherent systems become too large to treat exactly, then monotone approximations are easily defined. The algorithms proposed here not only provide simpler formulas but also produce best possible upper and lower application for the analysis of noncoherent fault trees and event tree sequences. DOE

N83-23100# California Univ., Livermore. Lawrence Livermore Lab.

FOCUS WAVE MODES IN HOMOGENEOUS MAXWELL'S EQUATION: TE-MODE

James Neill Brittingham 1982 6 p Presented at the IEEE Antennas and Propagation Soc. Natl. Radio Sci. Meeting, Albuquerque, N. Mex., 24-28 May 1982

(DE82-006922; UCRL-86512-Rev-2; CONF-820511-1) Avail: NTIS HC A02/MF A01

Mathematical formulations are presented for TE-mode, three-dimensional, solitary electromagnetic pulses propagating in free space. The pulses are required to satisfy the homogeneous Maxwell's equations, have a three-dimensional pulse structure, have no charge, move at light velocity in straight lines, have nondispersive pulses for all time, and have finite electromagnetic energy. DOE

N83-23101# California Univ., Livermore. Lawrence Livermore Lab.

THE INVERSE BORN APPROXIMATION: EXACT DETERMINATION OF SHAPE OF CONVEX VOIDS

Jon L. Opsal and James H. Rose (Iowa State Univ., Ames) 1982 12 p refs Presented at the DARPA Rev. of Progr. in Quantitative NDE, La Jolla, Calif., 1-6 Aug. 1982

(Contract W-7405-eng-48)

(DE83-000836; UCRL-88293; CONF-820820-7) Avail: NTIS HC A02/MF A01

The Inverse Born Approximation (IBA) to the elastic wave inverse scattering problem is known to give highly accurate results for the shape of complex voids. IBA is, in fact, exact for determining the size, shape and orientation of a wide class of these scatterers given infinite bandwidth and unlimited aperture information. The IBA algorithm picks out the singular contribution to the impulse response function and correctly relates it to the shape of the scatterer. Some specific examples are used to illustrate the more intuitive aspects of the discussion. DOE

N83-23102# Los Alamos Scientific Lab., N. Mex.

USE OF (D, MUF) AND MAXIMUM-LIKELIHOOD METHODS FOR DETECTING FALSIFICATION AND DIVERSION IN DATA-VERIFICATION PROBLEMS

A. S. Goldman and R. Beedgen (Kernforschungszentrum Karlsruhe) 1982 16 p refs Presented at the Intern. Symp. on Recent Advan. in Nucl. Mater. Safeguards, Vienna, 8-12 Nov. 1982

(Contract W-7405-eng-36)

(DE83-000606; LA-UR-82-2781; CONF-821119-7) Avail: NTIS HC A02/MF A01

The investigation of data falsification and/or diversion is of major concern in nuclear materials accounting procedures used in international safeguards. Two procedures, denoted by (D,MUF) and LR (likelihood ratio), are discussed and compared when testing the hypothesis that neither diversion nor falsification has taken place versus the one-sided alternative that at least one of these parameters is positive. Critical regions and detection probabilities are given for both tests. It is shown that the LR method outperforms (D,MUF) when diversion and falsification take place. DOE

N83-23103# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

THE MAXIMUM OF A QUASI-SMOOTH FUNCTION

J. Ernest Wilkins, Jr. and Theodore R. Hatcher 1982 28 p refs Presented at the 54th Natl. Tech. Assoc. Ann. Convention, Baltimore, 2 Aug. 1982

(Contract DE-AC07-76ID-01570)

(DE83-000561; EGG-M-07582; CONF-820890-2) Avail: NTIS HC A03/MF A01

Zygmund introduced the class of real valued functions f(x), defined and continuous on the closed interval I = (-1,1), such that (f(xi) - 2f(xi + eta)/2) + f (eta)) less than or equal to M (xi - eta) for some constant M and all xi and eta in I. Timan called such functions quasi-smooth. Let Z be the class of quasi-smooth functions for which M = 1 and f(-1) = f(+1) = 0. Suppose that K = sup max parallel f(x) parallel. Timan proved that K less than or equal to 4/3 and asserted that this was not the best result. Brudnyi attributed to Abramov the claim that K less than or equal to 383/288. He exhibited a function in Z whose maximum value is 5/4; hence K greater than or equal to 4/3 - 4/381 = 168/127 < 1.322835, and conjectured that K = 5/4. In this paper we prove that 1.3 = 13/10 less than or equal to K less than or equal to 1014/779 < 1.301669, thus disproving Sokolova's conjecture. DOE

N83-23104# Ames Lab., Iowa. Dept. of Mathematics.

ASYMPTOTIC FORMULAS FOR ELLIPTIC INTEGRALS Ph.D. Thesis

John Leroy Gustafson Dec. 1982 73 p refs

(Contract W-7405-eng-82)

(DE83-004793; IS-T-1014) Avail: NTIS HC A04/MF A01

Asymptotic formulas are derived for incomplete elliptic integrals of all three kinds when the arguments are real and tend to infinity or to zero. Practical error bounds are found for the asymptotic formulas. Several techniques are used, including a method recently discovered by R. Wong for finding asymptotic expansions with remainder terms for integral transforms. Incomplete elliptic integrals are used which possess a high degree of permutation symmetry in the function arguments. The asymptotic formulas are applicable to complete elliptic integrals as a special case; some of the error bounds are treated separately in the complete case. Numerical examples are given to demonstrate the typical accuracy which can be expected from the formulas, as well as the closeness of the error bounds. DOE

N83-23105# Los Alamos Scientific Lab., N. Mex.

QUANTUM-CLASSICAL CORRESPONDENC FOR THE FOURIER SPECTRUM OF A TRAJECTORY

E. J. Heller 1982 18 p refs Presented at CNLS Order in Chaos Conf., Los Alamos, N. Mex., 24 May 1982

(Contract W-7405-eng-36)

(DE83-000638; LA-UR-82-2705; CONF-8205121-4) Avail: NTIS HC A02/MF A01

The question of classical-quantum correspondence of the Fourier spectrum of a classical variable is addressed. DOE

N83-23106# Argonne National Lab., Ill. Mathematics and Computer Science Div.

JAKEF: A PORTABLE SYMBOLIC DIFFERENTIATOR OF FUNCTIONS GIVEN BY ALGORITHMS

Kenneth E. Hillstrom Aug. 1982 27 p refs

(Contract W-31-109-eng-38)

(DE83-000928; ANL-82-48) Avail: NTIS HC A03/MF A01

JAKEF is a compiler that accepts as data a single or double precision FORTRAN subroutine program defining an objective function F(x) or a vector function f(x) and produces as output a single or double precision FORTRAN program defining the gradient of F(x) or the jacobian of f(x). DOE

N83-23107# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.

LINEAR LEAST SQUARES WITH BOUNDS AND LINEAR CONSTRAINTS

Richard J. Hanson Aug. 1982 15 p refs

(Contract DE-AC04-76DP-00789)

(DE83-000408; SAND-82-1517) Avail: NTIS HC A02/MF A01

An algorithm is given for solving linear least squares systems of algebraic equations subject to constraints. The types of constraints considered are simple bounds on the unknowns and (more general) linear equality and inequality constraints. The method used is a penalty function approach wherein the linear constraints are (effective) heavily weighted. The resulting system is then solved as an ordinary bounded least squares system except for some numerical details. Codes are available that implement the algorithm. They are written in the SFTRAN3 FORTRAN preprocessor language. A version is available in FORTRAN 77 that is output from the SFTRAN3 preprocessor. DOE

N83-22268*# City Univ. of New York, N. Y.
ALGORITHMS FOR ON-LINE PARAMETER AND MODE SHAPE ESTIMATION
Frederick E. Thau *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 151-160 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 12A

N83-22271*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
LARGE SPACE STRUCTURES CONTROL ALGORITHM CHARACTERIZATION
E. Fogel *In* NASA. Langley Research Center Structural Dyn. and Control of Large Space Struct., 1982 Apr. 1983 p 181-194 (For primary document see N83-22256 12-15)
Avail: NTIS HC A12/MF A01 CSCL 12A

N83-23016# National Research Inst. for Mathematical Sciences, Pretoria (South Africa). Mathematics and Dynamic Meteorology Div.
POLYNOMIAL SYSTEMS AND DUALITY
G. Naude and C. Nolte *In its* Symp. on Control Theory and Appl. 1982 5 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

N83-23025# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
MULTIVARIABLE POLYNOMIAL POSITIVITY TESTING
D. H. Martin *In its* Symp. on Control Theory and Appl. 1982 8 p refs Sponsored in part by a grant from Control Data (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N83-23108# California Univ., Berkeley. Operations Research Center.
AN INCENTIVE APPROACH TO ELICITING PROBABILITIES
Ross D. Shacter Jul. 1982 15 p refs Submitted for publication (Grant AF-AFOSR-0122-81; AF Proj. 2304)
(AD-A122599; ORC-82-9) Avail: NTIS HC A02/MF A01 CSCL 05/10

A decision-maker (e.g., the Nuclear Regulatory Commission) seeks an expert's probabilities for uncertain quantities of interest (e.g., a seismologist's forecast of earthquakes), and wants the expert's reward to depend on the accuracy of the predictions. Assume that the expert compares compensation schemes on the basis of the expected utility of the dollar payoffs, and is willing to reveal his utility function for money. A reward is called proper if the expert is never encouraged to state probabilities he does not truly believe. It is strictly proper if he is, in fact, encouraged to state his beliefs. The reward procedure suggested in this paper uses the expert's stated probabilities and utility function to select from a set of possible payoffs. This procedure is always proper, but may not be strictly proper . If the preferred payoff is independent of the outcome whenever the decision-maker and expert agree on the probabilities, then they are said to be jointly risk-averse. (For example, if the decision-maker agrees to play bookie to a risk-averse expert, then they are jointly risk-averse.) In this case, the reward is shown to be strictly proper, as long as they don't disagree too much, so the expert can gain from researching the problem and carefully assessing his probabilities. In addition, the expert would prefer to make the bet more detailed, distinguishing between finer grain events, whenever such detail exposes new differences of opinion. Author (GRA)

N83-23015# Council for Scientific and Industrial Research, Pretoria (South Africa). Mathematics and Dynamic Meteorology Div.
AN ALTERNATIVE APPROACH TO NONLINEAR FILTERING: MAXIMIZING THE PROBABILITY OF HITTING A TARGET SET
Y. Yavin *In* NRIMS Symp. on Control Theory and Appl. 1982 20 p refs Sponsored in part by a grant for Control Data Submitted for publication (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics.* For astrophysics see *90 Astrophysics.* For solar physics see *92 Solar physics.*

N83-23109# Utah Univ., Salt Lake City. Dept. of Physics.
SEARCH FOR A SLOW-MOVING FLUX OF MASSIVE MAGNETIC MONOPOLES
D. E. Groom, E. C. Loh, and D. M. Ritson (Stanford Linear Accelerator Center) 1982 9 p refs Presented at the 21st. Intern. Conf. on High Energy Phys., Paris, 26-31 Jul. 1982
(Contract DE-AC03-76ER-00850)
(DE82-022254; CONF-820718-11) Avail: NTIS HC A02/MF A01

A 3.2 sq m. scanning radiometer (sr) detector was used to search for slow moving weakly ionizing particles. The detector is located at a mean depth of 507 hg/sq. cm. in the Mayflower Mine, Utah. It consists of coincident pairs of plastic scintillators arranged in three layers. The sensitivity was gradually increased so that the threshold is now at about 0.12 I sub min., where it should detect magnetic monopoles in the velocity range 0.00014 to 0.03 c. The present flux limit at this bias corresponds to an aperture-solid angle-time product of 1/(10 to the minus 11th power/sq cm/sr/s). DOE

N83-23110# Oak Ridge National Lab., Tenn. Engineering Physics Div.
APPLICATION OF GROUP THEORY TO DATA REDUCTION
F. G. Perey Sep. 1982 77 p refs
(Contract W-7405-eng-26)
(DE82-021113; ORNL-5908) Avail: NTIS HC A05/MF A01

Group theory can be used to provide a general method of data reduction whereby only the laws of a particular theory are used in the analysis of observations. This application of group theory involves introducing a group of transformations of the physical system upon which the observations were made. This

group of transformations leaves invariant the entities of the theory corresponding to the observations made but transforms the entities that were not observed from what they are presumed to be in this theory into what they are not, called possibilities for what they are. There is a well-known invariant associated with functionals of group elements which is invariant with respect to the parametrization of this group. It is the normalized volume measure in the group manifold of the possibilities-generating group. This invariant measure is called the physical probability of the possibilities since it is a probability measure which has a Borel algebra. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N83-23111 British Broadcasting Corp., London (England). Engineering Div.

SOME ASPECTS OF THE TRANSMISSION OF SOUND PANELS AND OF OUTSIDE BROADCAST VEHICLE SOUND INSULATION

E. W. Taylor Mar. 1983 22 p refs

(BBC-RD-1983/1) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

The derivation of the standard relationship between transmission loss and airborne sound insulation is discussed for the case in which the transmitting panel does not occupy the complete common wall between two rooms. The dependence of this relationship on the assumptions made in its derivation and on the nature of the sound fields on the two sides of the panel is considered, particularly for the case of the sound insulation between the exterior and interior of an Outside Broadcast vehicle. A particular relationship between transmission loss and sound insulation is put forward for this case and tests to confirm this relationship experimentally are described. Sound insulation assessments on samples of vehicle wall material fabricated using a bonding process are discussed. Author

N83-23112*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NOISE OF THE 10-BLADED 60 DEG SWEPT SR-5 PROPELLER IN A WIND TUNNEL

James H. Dittmar, George L. Stefko, and Robert J. Jeracki Feb. 1983 12 p refs

(NASA-TM-83054; E-1508; NAS 1.15:83054) Avail: NTIS HC A02/MF A01 CSCL 20A

Noise generated by supersonic helical tip speed propellers is a possible cabin environment problem for future airplanes powered by these propellers. Noise characteristics of one of these propellers, designated SR-5, are presented. A matrix of tests was conducted to provide as much acoustic information as possible. During aerodynamic testing it was discovered that the propeller had an aeroelastic instability which prevented testing the propeller at its design advance ratio of 4.08 at axial Mach numbers over 0.7. Plots of the variation of the maximum blade passage tone with helical tip Mach number indicate that, at higher helical tip Mach numbers, the propeller operated on sharply increasing portion of the noise curve; therefore, extrapolations to the design condition would not be accurate. A possible extrapolation indicated that SR-5 at its design point should be quieter than SR-3 at its design point. Directivity plots at the higher helical tip Mach numbers indicate a lobed directivity pattern as was observed previously on the SR-3 propeller. M.G.

N83-23113*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AEROACOUTIC CHARACTERISTICS OF A LARGE, VARIABLE-PITCH, VARIABLE-SPEED FAN SYSTEM

P. T. Soderman and K. W. Mort Mar. 1983 7 p refs

(NASA-TM-84333; A-9259; NAS 1.15:84333) Avail: NTIS HC A02/MF A01 CSCL 20A

The acoustic and aerodynamic performance of the new drive fans for the NASA Ames 40- by 80-/80- by 120-foot wind tunnel was investigated. Results show that a fan system with variable-speed and variable-pitch rotor blades allows the operator to control noise and energy consumption, at a given mass flow rate, through the choice of blade speed and pitch. A low speed and high blade pitch will generally create the least noise at the least energy cost. An empirical method is described which predicts the sound power of this fan system reasonably well. Author

N83-23114*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPLICATION OF 3-SIGNAL COHERENCE TO CORE NOISE TRANSMISSION

Eugene A. Krejsa 1983 17 p refs Presented at the 8th Aeroacoustics Conf., Atlanta, 11-13 Apr. 1983; sponsored by AIAA

(NASA-TM-83333; E-1580; NAS 1.15:83333; AIAA-83-0759) Avail: NTIS HC A02/MF A01 CSCL 20A

A method for determining transfer functions across turbofan engine components and from the engine to the far-field is developed. The method is based on the three-signal coherence technique used previously to obtain far-field core noise levels. This method eliminates the bias error in transfer function measurements due to contamination of measured pressures by nonpropagating pressure fluctuations. Measured transfer functions from the engine to the far-field, across the tailpipe, and across the turbine are presented for three turbofan engines. M.G.

N83-23115*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPARISON OF MEASURED AND PREDICTED FLIGHT EFFECTS ON HIGH-BYPASS COAXIAL JET EXHAUST NOISE

James R. Stone 1983 20 p refs Presented at the 8th Aeroacoustics Conf., Atlanta, 11-13 Apr. 1983; sponsored by AIAA

(NASA-TM-83347; E-1604; NAS 1.15:83347; AIAA-83-0749) Avail: NTIS HC A02/MF A01 CSCL 20A

A semi-empirical model for predicting the noise generated by conventional-velocity profile coaxial jets is compared with full scale flight data and model scale simulated flight data for high bypass nozzles. The prediction model was shown to agree with small scale static data for primary jet velocities from 215 to 795 m/s for a wide range of area, temperature, and velocity ratios between streams. However, there were insufficient model nozzle, simulated flight data available at that time to permit validation of the flight effects prediction. The comparisons presented demonstrate that the prediction method is also valid in flight. M.G.

N83-23116*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio.

CROSS SPECTRA BETWEEN TEMPERATURE AND PRESSURE IN A CONSTANT AREA DUCT DOWNSTREAM OF A COMBUSTOR

J. H. Miles, C. A. Wasserbauer, and E. A. Krejsa 1983 28 p refs Presented at the 8th Aeroacoustics Conf., Atlanta, 11-13 Apr. 1983; sponsored by AIAA

(NASA-TM-83351; E-1608; NAS 1.15:83351; AIAA-83-0762) Avail: NTIS HC A03/MF A01 CSCL 20A

The feasibility of measuring pressure temperature cross spectra and coherence and temperature-temperature cross spectra and coherence at spatially separated points along with pressure and temperature auto-spectra in a combustion rig was investigated. The measurements were made near the inlet and exit of a 6.44 m long duct attached to a J-47 combustor. The fuel used was Jet A. The cross spectra and coherence measurements show the pressure and temperature fluctuations correlate best at low frequencies. At the inlet the phenomena controlling the phase relationship between pressure and temperature could not be identified. However, at the duct exit the phase angle of the pressure is related to the phase angle of the temperature by the convected flow time delay. M.G.

N83-23117*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOUND DIFFRACTION AT WALL IMPEDANCE DISCONTINUITIES IN A CIRCULAR CYLINDER, INVESTIGATED USING WIENER-HOPF TECHNIQUE
Y.-C. Cho 1983 27 p refs Presented at the 8th Aeroacoustics Conf., Atlanta, 11-13 Apr. 1983; sponsored by AIAA
(NASA-TM-83365; E-1631; NAS 1.15:83365; AIAA-83-0730) Avail: NTIS HC A03/MF A01 CSCL 20A

Rigorous solutions are presented for sound diffraction in a circular cylinder with axial discontinuities of the wall admittance (or impedance). Analytical expressions are derived for the reflection and the transmission copefficients for duct modes. The results are discussed quantitatively in the limits of small admittance shifts (delta) and of low frequencies (ka). One of the results is the low frequency behavior of the reflection coefficient R(o) sub 00 of the fundamental mode. For the mode of a hardwall duct reflected from the junction with a softwall duct, (R(o) sub oo yields - (1-square root of (ka) square root of (2/i delta)); this result is in contrast to the frequency dependence of the reflection from the open end of a hardwall duct, for which R(o) sub oo yields -[1-(ka) squared/2]. M.G.

N83-23118# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Environment Branch.
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 156. HH-1N IN-FLIGHT CREW NOISE
Harald K. Hille Nov. 1982 15 p ref
(AF Proj. 7231)
(AD-A122601; AMRL-TR-75-50-Vol-156) Avail: NTIS HC A02/MF A01 CSCL 01/2

The HH-IN is a USAF multi-purpose utility helicopter providing support for various USAF missions. This report provides measured data defining the bioacoustic environments at flight crew locations inside this helicopter during normal flight operations. Data are reported for two locations in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, USAF Bioenvironmental Noise Data Handbook, Vol. 1: Organization, Content and Application, AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Author (GRA)

N83-23119# Adaptronics, Inc., McLean, Va.
AUTOMATIC ULTRASONIC IMAGING SYSTEM WITH ADAPTIVE-LEARNING-NETWORK SIGNAL-PROCESSING TECHNIQUES
L. J. OBrien, N. A. Aravanis, J. R. Gouge, Jr., A. N. Mucciardi, D. K. Lemon, and J. R. Skorpik Apr. 1982 143 p refs Sponsored by EPRI
(EPRI Proj. 606; EPRI Proj. 1125)
(DE82-903854; EPRI-NP-2336) Avail: NTIS HC A07/MF A01

A conventional pulse-echo imaging system was modified to operate with a linear ultrasonic array and associated digital electronics to collect data from a series of defects fabricated in aircraft quality steel blocks. A thorough analysis of the defect responses recorded with this modified system showed that considerable improvements over conventional imaging approaches can be obtained in the crucial areas of defect detection and characterization. A combination of advanced signal processing concepts with the adaptive learning network methodology forms the basis of these improvements. Use of established signal processing algorithms such as temporal and spatial beamforming in concert with a sophisticated detector has provided a reliable defect detection scheme which can be implemented in a microprocessor-based system to operate in an automatic mode. DOE

N83-23120# Centre Technique des Industries Mecaniques, Senlis (France).
IMPROVEMENT OF THE DESIGN AND UTILIZATION OF ACOUSTICAL TRANSMISSION SENSORS
J. Roget Oct. 1982 21 p refs Transl. into ENGLISH from the mono. "Amelioration de la Conception et de l'Utilisation des capteurs d'Emission Acoustique" (France), Jun. 1981 33 p
(PB83-115733; CETIM-15-Y-041) Avail: NTIS HC A02/MF A01 CSCL 20A

The characteristics of commercially available piezoelectric ceramics were comparatively analyzed and the bonding agent was tested to improve sensor construction. Five types of nonpiezoelectric sensors (electret, optical, electromagnetic, magnetorestrictive, and capacity type) were assessed. A first approach to calibration problems was established. GRA

N83-23121# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
WAVE PROPAGATION IN FOCUSING RANDOM MEDIA
Thomas L. Clarke May 1982 158 p refs
(PB83-115659; NOAA-TM-ERL-AOML-51; NOAA-82081903) Avail: NTIS HC A08/MF A01 CSCL 20A

The problem considered is that of calculating the moments of waves propagating in a medium with random refractive index fluctuations and deterministic focusing. Focal regions produced by deterministic refractive index variations are defined within the ray approximation and classified into two types: the caustic and the cusp. The caustic and the cusp are the only focal regions in two dimensions which are stable to small perturbations of the refractive index. A Monte-Carlo simulation is used to estimate the moments of the field in several cases of interest. The moments are found to depend on the strength of the fluctuations in a complicated way when the generalized diffraction parameter is near unity. In particular, the scintillation index is large at local intensity minima even for relatively weak fluctuations. Fluctuation parameters for local regions produced in underwater sound propagation are estimated. GRA

N83-23122# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
ALGORITHMS FOR REFLECTING RAYS FROM GENERAL TOPOGRAPHIC SURFACES IN A RAY TRACING PROGRAM
R. M. Jones Jul. 1982 65 p ref
(PB83-112953; NOAA-TM-ERL-WPL-98; NOAA-82083102) Avail: NTIS HC A04/MF A01 CSCL 20A

Algorithms are presented which enable a programmer to translate flow charts into computer program subroutines for three dimensional ray tracing computer programs that calculate ray paths by numerical integration of Hamilton's equations. The surface of the terrain can be expressed either by giving height as a function of longitude and latitude or as a function of the form f(r, theta, phi) = 0, where r, theta, and phi are Earth centered spherical polar coordinates. In either case, the terrain model must specify partial derivatives, and all specified derivatives must be continuous functions of the arguments. Flow charts and equations are given for the following subtasks: (1) estimating when the ray may intersect the terrain surface; (2) recognizing that the ray may have intersected the terrain surface between integration steps; (3) stepping the ray to the point of intersection with the surface by numerical integration; and (4) reflecting the ray at the surface. GRA

N83-22472# Miller (V. R.), Huber Heights, Ohio.
TEXTBOOKS AND PERIODICAL LITERATURE IN ACOUSTICS
V. R. Miller *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 15, no. 2 Jan. 1983 p 5-16 refs (For primary document see N83-22471 12-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/1

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N83-23123# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

OBSERVATIONS OF OPTICAL EMISSIONS FROM PRECIPITATION OF ENERGETIC NEUTRAL ATOMS AND IONS FROM THE RING CURRENT

R. P. Rohrbaugh, B. A. Tinsley, H. Rassoul, Y. Sahai, N. Teixeira, R. W. Tull, D. R. Doss, A. L. Cochran, W. D. Cochran, and E. B. Barker Mar. 1983 41 p refs Submitted for publication Prepared in cooperation with Texas Univ. at Dallas, Richardson and Texas Univ., Austin

(INPE-2671-PRE/280) Avail: NTIS HC A03/MF A01

Emissions due to particle precipitation were observed at low latitude sites and results were compared for magnetic storms of 13 April 1981 and 14 July 1982. The emissions have the characteristics appropriate to the precipitation into the thermosphere of energetic neutral atoms and/or ions originating in the ring current. The characteristics include high rotational/vibrational excitation of the N2(+) 1N bands and at times the occurrence of HB alpha beta emissions with the same onset time as the N2(+) 1N emission and partial correlation with it afterward. the latitude variation shows a strong increase from low to mid latitudes. The strongest emissions occur in the evening to midnight local time period; and the storm time variation shows strongest emissions during main phases. The time variation of HB alpha beta and N2(+) 1N emissions indicate that there is more 0/0 (+) precipitation than H/H(+) precipitation in the latter part, and sometimes the whole duration of the precipitation events, and the variations are consistent with H(+) being lost from the inner ring current faster than other species such as O(+) and He(+). Author

N83-23124# Oak Ridge National Lab., Tenn.

ATOMIC AND IONIC SPECTRUM LINES BELOW 2000A: HYDROGEN THROUGH ARGON

R. L. Kelly Oct. 1982 408 p refs

(Contract W-7405-eng-26)

(DE83-002582; ORNL-5922) Avail: NTIS HC A18/MF A01

A critical tabulation of observed spectral lines below 2000 angstroms has been prepared from the published literature up to July 1978. It is intended principally as an aid to those physicists and astronomers who deal with the spectra of highly stripped atoms. This report includes the first 18 elements, from hydrogen (including deuterium) through argon. The tabulation is divided into two main sections: the spectrum lines by spectrum, and a finding list. The entries for each element give the ionization species, ground state term, and ionization potential, as well as the best values of vacuum wavelength, intensity, and classification. A list of the pertinent references is appended at the end. DOE

N83-23125# Sandia Labs., Albuquerque, N. Mex.

EXPERIMENTAL STUDY OF GRAD-B DRIFT-ELECTRON TRANSPORT

J. R. Lee and J. R. Hartmann Nov. 1982 40 p refs

(Contract DE-AC04-76DP-00789)

(DE83-003028; SAND-82-2096) Avail: NTIS HC A03/MF A01

We have experimentally studied electron-beam transport via gradient-B drift in the applied magnetic field generated by a current-carrying wire. The electron beam transported 89 cm to a tantalum target. The measured drift velocity was 4.12 + or - .26 cm/nsec for .83-MV electrons with a 75-kamp wire current, in good agreement with the theoretically expected value of 3.83 cm/nsec. We studied X-ray production in the tantalum target as a function of the wire current, the target thickness, the gas pressure in the drift tube, and the length of a beam-expansion gap proceeding the drift region. DOE

N83-23126# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

METAL-ATOM FLUORESCENCE FROM THE QUENCHING OF METASTABLE RARE GASES BY METAL CARBONYLS

W. E. Hollingsworth Nov. 1982 134 p refs

(Contract DE-AC03-76SF-00098)

(DE83-004118; LBL-14917) Avail: NTIS HC A07/MF A01

A flowing afterglow apparatus was used to study the metal fluorescence resulting from the quenching of metastable rare gas states by metal carbonyls. The data from the quenching of argon, neon, and helium by iron and nickel carbonyl agreed well with a restricted degree of freedom model indicating a concerted bond breaking dissociation. DOE

N83-23127# Texas Univ., Austin. Dept. of Physics.

NUCLEAR-STRUCTURE STUDIES USING THE HIGH-RESOLUTION SPECTROMETER AT THE LOS ALAMOS CLINTON P. ANDERSON MESON PHYSICS FACILITY Progress Report

Dec. 1982 126 p refs

(Contract DE-AS05-80ER-10638)

(DE83-004563; DOE/ER-10638/3) Avail: NTIS HC A07/MF A01

The ongoing medium energy nuclear physics research program is described. A major part of the work is associated with research done using a high resolution spectrometer. This research focuses on: (1) providing data which test microscopic models of the medium energy proton + nucleus interaction; (2) providing data which are to be analyzed to provide nuclear structure information (both ground state and excited state); and (3) developing and improving the models themselves. DOE

N83-23128# Brookhaven National Lab., Upton, N. Y.

PROTON DECAY, 1982

W. J. Marciano 4 Mar. 1982 24 p refs Presented at 19th Orbis Sci. Meeting, Coral Gables, Fla., 18 Jan. 1982

(Contract DE-AC02-76CH-00016)

(DE82-012023; BNL-31036; CONF-820142-2) Avail: NTIS HC A02/MF A01

Employing the current world average Lambda/sub MS/ = 0.160 GeV as input, the minimal Georgi-Glashow SU(5) model predicts sq sin theta/sub W/(m/sub W/) = 0.214, m/sub b/m/sub tau/ approximately 2.8 and tau/sub p approximately (0.4 approximately 12) x 10 approximately to the 29th power yr. The first two predictions are in excellent agreement with experiment; but the implied proton life time is already somewhat below the present experimental bound. In this status report, uncertainties in tau/sub p/ are described and effects of appendages to the SU(5) model (such as new fermion generations, scalars, supersymmetry, etc.) are examined. DOE

N83-23129# California Univ., Livermore. Lawrence Livermore Lab.

EXTRACTED CURRENT DENSITIES FROM SURFACE CONVERSION SOURCES OF NEGATIVE IONS

Joel H. Fink (Westinghouse Electric Corp.) 10 Feb. 1982 10 p refs

(Contract W-7405-eng-48)

(DE82-009004; UCID-19330) Avail: NTIS HC A02/MF A01

The condition for extracting a maximum negative ion current density is found when the product of the radius of the negative ion conversion electrode, the cross-section for negative and positive ion recombination, and the density of positive ions in the ion source equals one. The optimum output is obtained at the highest positive ion density and the smallest electrode radius. DOE

N83-23130# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.

STRUCTURE OF NUCLEI FAR FROM BETA STABILITY Progress Report, 15 May 1981 - 14 May 1982

E. F. Zganjar 1982 30 p refs

(Contract DE-AS05-76ER-04935)

(DE82-012297; DOE/ER-04935/053) Avail: NTIS HC A03/MF A01

Progress on experimental studies of the nuclear structure of nuclei for from beta stability is reported. Investigations at UNISOR, GSI, and TRISTAN are described. Investigations at UNISOR include

odd-proton nuclei of gold, thallium, and cesium and odd-neutron deficient nuclei of mercury and platinum. DOE

N83-23131# Argonne National Lab., Ill. Applied Physics Div.
FAST-NEUTRON ELASTIC-SCATTERING CROSS SECTIONS OF ELEMENTAL TIN
C. Budtz-Jorgensen (Central Bureau for Nuclear Measurements), P. T. Guenther, and A. Smith Jul. 1982 21 p refs
(Contract W-31-109-eng-38)
(DE83-004435; ANL/NDM-73) Avail: NTIS HC A02/MF A01

Broad-resolution neutron-elastic-scattering cross sections of elemental tin are measured from 1.5 to 4.0 MeV. Incident-energy intervals are approx. 50 keV below 3.0 MeV and approx. 200 keV at higher enegies. Ten to twenty scattering angles are used, distributed between approx. 20 and 1600. The experimental results are used to deduce the parameters of a spherical optical-statistical model and they are also compared with corresponding values given in FNDF/B-V. DOE

N83-23132# Los Alamos Scientific Lab., N. Mex.
CHARGED-PARTICLE ELASTIC CROSS SECTIONS
G. M. Hale, D. C. Dodder, and J. C. DeVeaus (Illinois Univ., Urbana) 1982 6 p refs Presented at the Nucl. Data for Sci. and Technol. Intern. Conf., Antwerp, 6-10 Sep. 1982
(Contract W-7405-eng-36)
(DE83-000663; LA-UR-82-2644; CONF-820942-19) Avail: NTIS HC A02/MF A01

Modern treatments of energy loss in plasmas through elastic scattering of energetic ions require complete knowledge of charged-particle elastic cross sections. R-matrix theory provides an explicit separation of nuclear and Coulomb effects in these cross sections, and gives reasonable extrapolations to small angles and low energies, where data may be scarce. We outline the calculation of charged-particle elastic cross sections from R-matrix parameters, and given examples for d-T, d-(-), and t-(-) scattering, obtained from comprehensive analyses of reactions in the (5) He, (6) Li, and (7) Li compound systems. Expansion coefficients for an exact polynomial representation for the difference of the scattering and Rutherford cross sections (sigma/sub NI/) are given for d-T scattering. Integral guantities involving sigma/sub NI/ calculated from the present cross sections disagree substantially in some cases near resonances with a recent Livermore evaluation. DOE

N83-23133# Rochester Univ., N. Y.
STUDY OF THE FORWARD PRODUCTION OF CHARM STATES AND PROMPT MUONS IN 350 GeV P-Fe AND 278 GeV PI P-Fe INTERACTIONS
A. Bodek, R. Breedon, R. N. Coleman, W. Marsh, S. Olsen, J. L. Ritchie, Ian Stockholm, B. C. Barish, R. L. Messner, M. H. Shaevitz et al Aug. 1982 6 p refs Presented at the 13th Intern. Symp. on Multiparticle Dyn., Volendam, Netherlands, 6 Jun. 1982 and at the Neutrino 82 Conf., Balatron, Hungary, Jun. 1982 Prepared in cooperation with California Inst. of Technology, Pasadena, Chicago Univ., Fermi National Accelerator Lab., Batavia, Ill., and Stanford Univ., Calif.
(Contract DE-AC02-76ER-13065)
(DE82-019276; DOE/ER-13065/335; UR-827; CONF-8206117-1) Avail: NTIS HC A02/MF A01

The forward production of charm states interactions was studied via the production of prompt single muons with momentum P > 20 GeV/c. The data indicate equal production of single mu + and mu - in proton interactions, and a large asymmetry in pion interactions. The observed momentum distributions of the prompt single muons can be satisfactorily fit by the hypothesis that D mesons are produced with an invariant cross section proportional to (1-x)/sup n/, and do not favor large diffractive cross sections predicted by intrinsic charm models. The total cross sections and the x dependence of the forward production of charm states is extracted for D's and anti D's in proton and pion interactions. DOE

N83-23134# Brookhaven National Lab., Upton, N. Y.
THE X-RAYS FROM SYNCHROTRON: NEW CHALLENGE FOR NEUTRON SCATTERING
G. Shirane Aug. 1982 20 p refs Presented at 6th Yamada Conf. on Neutron Scattering of Condensed Matter, Tokyo, 1 Sep. 1982
(Contract DE-AC02-76CH-00016)
(DE82-021565; BNL-31790; CONF-820935-3) Avail: NTIS HC A02/MF A01

Current developments in X-ray scattering techniques at synchrotron radiation facilities are reviewed. Highly collimated, intense white radiations open up new areas of research in condensed matter physics and challenge the traditional domains of neutron scattering. These include energy dispersive scattering, the use of anomalous dispersion, magnetic diffraction and direct energy analysis by backscattering. The relative merits of X-ray and neutron scattering techniques are discussed. The advantage of neutron scattering is the capability of performing polarization analysis. Developments at Brookhaven in inelastic scattering of polarized neutrons are discussed as well as special technical problems associated with the search for phasons utilizing a high resolution triple axis spectrometer. DOE

N83-23135# Oak Ridge National Lab., Tenn.
NEUTRON SCATTERING REVIEW: MAGNETIC STUDIES
W. C. Koehler Aug. 1982 7 p refs Presented at Conf. on the Neutron and its Appl., Cambridge, England, 13 Sep. 1982
(Contract W-7405-eng-26)
(DE82-022335; CONF-820950-2) Avail: NTIS HC A02/MF A01

The contributions of neutron scattering to studies of magnetism are related historically. The interplay between theory and experiment is demonstrated. DOE

N83-23136# Sandia Labs., Albuquerque, N. Mex.
THE MILO, A MIRROR REFLECTIVITY CODE FOR LOW-ENERGY X-RAYS
L. Kissel Sep. 1982 36 p refs
(Contract DE-AC04-76DP-00789)
(DE83-000407; SAND-82-0448) Avail: NTIS HC A03/MF A01

An interactive fault-tolerant user-oriented code which calculates low energy X-ray mirror reflectivity, MILO combines user input with previously calculated, complex, atomic scattering factors to produce the unpolarized mirror reflectivity at various values of mirror angle and photon energy. The code can calculate the reflectivity of mirrors composed of pure elements and of homogeneous mixtures of elements. MILO is written in standard, high-machine-independent, FORTRAN 77 (ANSI X3.9-1978). DOE

N83-23137# Brookhaven National Lab., Upton, N. Y.
FISSILE-FUEL PRODUCTION BY LINER ACCELERATORS
H. Takahashi, P. Grand, J. R. Powell, M. Steinberg, and H. J. C. Louts 1982 7 p refs Presented at the Am. Nucl. Soc. Winter Meeting, Washington, D.C., 14 Nov. 1982
(Contract DE-AC02-76CH-00016)
(DE82-018114; BNL-31603; CONF-821103-10) Avail: NTIS HC A02/MF A01

Fissile fuel production by linear accelerators has advantages over fast breeders with respect to the absence of critically problems and a higher net production rate of fuel. As part of the NASAP effort, a design study of the light-water reactor fuel enricher/regenerator, has been performed under the restriction that fuel was not to be reprocessed. The enricher/regenerator uses liquid lead jets as the target for the accelerator beam. The generated neutrons were then captured in an LWR fuel assembly for in-situ generation of fissile fuel. If the restriction of no reprocessing is removed, uranium or thorium elements can be irradiated directly with high-energy protons. The fissile fuel production rate and the heat regeneration due to high- and low-energy fission reaction are thus considerably increased, i.e., by at least a factor of two, as compared with liquid lead targets. DOE

N83-23138# Los Alamos Scientific Lab., N. Mex.
THE LIGHT WEIGHT RADIOISOTOPE HEATER UNIT (LWRHU):

A TECHNICAL DESCRIPTION OF THE REFERENCE DESIGN
R. E. Tate Jan. 1982 39 p refs
(Contract W-7405-eng-36)
(DE82-014121; LA-9078-MS) Avail: NTIS HC A03/MF A01

The Light Weight Radioisotope Heater Unit (LWRHU), a new radioisotope heater unit for use in space missions, is a 238 PuO2-fueled unit designed to provide a thermal watt in dispersed locations on a spacecraft. The LWRHU is required to maintain the temperature of a component at a level where the component will function reliably in space. Two major constraints are placed on the unit's design; it must be as light as possible and must provide enough protection to immobilize the plutonium fuel to the maximum extent in all phases of the unit's lifetime. The four components are pelletized fuel, platinum-alloy encapsulation, pyrolytic graphite thermal insulation, and high-technology graphite ablation shell. The LWRHU is a cylinder 32 mm (1.26 in.) high and 26 mm (1.02 in.) in diameter. It weighs slightly less than 0 g(.09 lb). DOE

N83-23139# Arizona Univ., Tucson. Dept. of Chemistry.
CONTINUED INVESTIGATIONS INTO TECHNIQUES PRODUCING SELECTIVE CHEMICAL REACTIONS ON SURFACES AND TARGET SPHERES AND RELATED STUDIES
M. Bonner Denton 19 Feb. 1982 91 p refs
(Contract W-7405-eng-48)
(DE82-012070; UCRL-15441) Avail: NTIS HC A05/MF A01

Efforts leading to the development and characterization of a compact ion source and optical transfer system producing relatively high current density ion beams are described. The ion source and beam transfer system represent a major advance in the state of the art in that high current densities at low kinetic energies have been achieved for high molecular weight polyatomic ions. Indeed, the ion beams produced display ion abundance patterns typical of simple low energy electron impact ionization processes. DOE

N83-22965# Argonne National Lab., Ill.
NEUTRON AND X-RAY SMALL-ANGLE SCATTERING
C. S. Borso, B. I. Berkoff (Princeton Univ.), and C. T. Mizumoto (Pacific Union College) *In* ANL Biol. and Med. Res. Jun. 1982 p 95-97 refs (For primary document see N83-22951 12-51)
Avail: NTIS HC A08/MF A01

N83-23014# Council for Scientific and Industrial Research, Pretoria (South Africa). Control System Div.
THE COMPUTER-BASED CONTROL SYSTEM OF THE NAC ACCELERATOR
G. F. Burdzik, R. F. A. Bouckaert, I. Cloete, J. S. duToit, I. H. Kohler, J. N. J. Truter, K. Visser, and V. C. St. J. Wikner (Southern Universities Nuclear Inst.) *In* NRIMS Symp. on Control Theory and Appl. 1982 12 p refs (For primary document see N83-23007 12-59)
Avail: NTIS HC A13/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N83-23140*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HEAVY-ION TOTAL AND ABSORPTION CROSS SECTIONS ABOVE 25 MeV/NUCLEON
Lawrence W. Townsend, John W. Wilson, and Hari B. Bidasaria (Old Dominion Univ.) Apr. 1983 44 p refs
(NASA-TP-2138; L-15566; NAS 1.60:2138) Avail: NTIS HC A03/MF A01 CSCL 20H

Within the context of a double-folding optical potential approximation to the exact nucleus-nucleus multiple-scattering series, eikonal scattering theory is used to generate tables of heavy ion total and absorption cross sections at incident kinetic energies above 25 MeV/nucleon for use in cosmic ray high-energy heavy ion transport and shielding studies. Comparisons of predictions with nucleus-nucleus experimental data show excellent agreement except at the lowest energies, where the eikonal approximation may not be completely valid. Even at the lowest energies, however, agreement is typically within 20 percent. M.G.

N83-23141# Sandia Labs., Albuquerque, N. Mex.
SUBSEABED DISPOSAL PROGRAM. VOLUME 1: SUMMARY Annual Report, Jan. - Dec. 1980
K. R. Hinga, ed. Feb. 1982 47 p refs
(Contract DE-AC04-76DP-00789)
(DE82-012378; SAND-81-1095-Vol-1) Avail: NTIS HC A03/MF A01

This is the seventh annual report describing the results of the investigations of the Subseabed Disposal Program. The program, international in scope, is evaluating the feasibility of disposing of high-level radioactive wastes by burial in certain geologically stable and economically valueless sediments of the deep sea floor. DOE

N83-23142# Pacific Northwest Lab., Richland, Wash.
OCEAN DUMPING OF LOW-LEVEL RADIOACTIVE WASTES
W. L. Templeton Oct. 1982 17 p
(Contract DE-AC06-76RL-01830)
(DE83-002709; PNL-SA-10831) Avail: NTIS HC A02/MF A01

Scientific bases, developed internationally over the last 20 years, to control and restrict to acceptable levels the resultant radiation doses that potentially could occur from the dumping of low-level radioactive wastes in the deep oceans were presented. It is concluded that present evaluations of the disposal of radioactive wastes into the oceans, coastal and deep ocean, indicate that these are being conducted within the ICRP recommended dose limits. However, there are presently no international institutions or mechanisms to deal with the long-term radiation exposure at low-levels to large numbers of people on a regional basis if not a global level. Recommendations were made to deal with these aspects through the established mechanisms of NEA/OECD and the London Dumping Convention, in cooperation with ICRP, UNSCEAR and the IAEA. DOE

N83-23143# California Univ., Berkeley. Lawrence Berkeley Lab.
THERMODYNAMIC PROPERTIES OF CHEMICAL SPECIES IN NUCLEAR WASTE
N. Edelstein, J. Bucher, R. Silva, and H. Nitsche Jan. 1983 121 p refs
(Contract DE-AC06-76RL-01830)
(DE83-005249; ONWI-399; LBL-14325) Avail: NTIS HC A06/MF A01

Thermochemical data on the solubilities of compounds and solution complexes of the waste radionuclides likely to form in the natural systems are required to adequately assess and predict the ability of the storage site to meet established site characteristics and standards for rates of release of radioactive materials set by the US Nuclear Regulatory Commission. Taken as a group, the actinides U, Np, Pu, Am, and Cm represent the largest potential long-term hazard. However, with the exception of U, reliable thermochemical data for even the simple compounds and solution complexes that the important actinides might form with the common ground-water anions is rather incomplete. In particular, very little data exist for the anions, hydroxide, carbonate, and phosphate. Investigations of the hydrolysis of Nd(3) (a natural analog for Am and Cm) and Cm(3), the carbonate complexation of NpO2( ), and the solubilities of Nd(3) and Am(3) in near neutral pH solutions have been conducted. A value of log K = -7.7 + or - 0.3 was obtained for the first hydrolysis constant of both Nd(3) and Cm(3). For the carbonate complexes of NpO2( ), values of 5.9 + or - 0.5 for log (ALPHA) 1 and 16.3 + or - 0.5 for log (ALPHA)3 were determined for the formation constants of NpO2CO3(+) and NpO2(CO3)3(5+), respectively. From measurements of solution Am concentrations as a function of pH, a value of -7.5 was estimated for the logarithm of the solubility product of amorphous Am(OH)3, i.e., Am(OH)3 (solid) + 3H( ) = Am(3) + 3 H2O. DOE

N83-23144# Oak Ridge National Lab., Tenn. Chemical Technology Div.
REGIONAL GEOLOGICAL ASSESSMENT OF THE DEVONIAN-MISSISSIPPIAN SHALE SEQUENCE OF THE APPALACHIAN, ILLINOIS, AND MICHIGAN BASINS RELATIVE TO POTENTIAL STORAGE/DISPOSAL OF RADIOACTIVE WASTES
T. F. Lomenick, S. Gonzales (Georgia Univ.), K. S. Johnson, and D. Byerly (Tennessee Univ.) Jan. 1983 166 p refs
(Contract W-7405-eng-26)
(DE83-005178; ORNL-5703) Avail: NTIS HC A08/MF A01

The thick and regionally extensive sequence of shales and associated clastic sedimentary rocks of Late Devonian and Early Mississippian age has been considered among the nonsalt geologies for deep subsurface containment of high level radioactive wastes. Regional and basin specific characteristics of the black and associated nonblack shales of this sequence within the Appalachian, Illinois, and Michigan basins of the north central and eastern United States were examined. Principal areas where the thickness and depth of this shale sequence are sufficient to warrant further evaluation are identified, but no attempt is made to identify specific storage/disposal sites. Summary evaluations are given for each basin as well as an overall general evaluation of the waste storage/disposal potential of the Devonian-Mississippian shale sequence. Based on data compiled in this cursory investigation, certain rock units have reasonable promise for radioactive waste storage/disposal and do warrant additional study. B.G.

N83-23145# Pacific Northwest Lab., Richland, Wash.
THE AEGIS TECHNOLOGY DEMONSTRATION FOR A NUCLEAR WASTE REPOSITORY IN BASALT. ASSESSMENT OF EFFECTIVENESS OF GEOLOGIC ISOLATION SYSTEMS
F. H. Dove, C. R. Cole, and M. G. Foley Sep. 1982 386 p refs
(Contract DE-AC06-76RL-01830)
(DE83-000913; PNL-3632) Avail: NTIS HC A17/MF A01

A technology demonstration of performance assessment techniques as applied to a nuclear waste repository in the Columbia Plateau Basalts was conducted. Hypothetical repository coordinates were selected for an acutal geographical setting on the Hanford Reservation in the state of Washington. Available information was used to establish the data base and initial hydrologic and geologic interpretations for this site-specific application. A simplified diagram of the AEGIS analyses is shown. Because an understanding of the dynamics of ground water flow is essential to the development of release scenarios and consequence analyses, a key step in the demonstration is the systems characterization contained in the conceputal model. Regional and local ground water movement patterns were defined with the aid of hydrologic computer models. DOE

N83-23146# Los Alamos Scientific Lab., N. Mex.
REENTRY THERMAL TESTING OF A GENERAL PURPOSE HEAT SOURCE FUELED CLAD
D. E. Peterson and C. E. Frantz Mar. 1982 13 p refs
(Contract W-7405-eng-36)
(DE82-014125; LA-9227) Avail: NTIS HC A02/MF A01

A General Purpose Heat Source module was exposed to heat treatments simulating an isothermal prelaunch condition, followed by thermal pulses corresponding to atmospheric reentry. Helium release rates were determined during each heating and modeled after simple diffusion theory. Following the tests, the module was examined metallurgically with no evidence of swelling of the cladding nor degradation of the fuel. DOE

N83-23147# Los Alamos Scientific Lab., N. Mex.
REENTRY THERMAL TESTING OF LIGHT-WEIGHT RADIOISOTOPE HEATER UNIT
D. E. Peterson and J. S. Starzynski Mar. 1982 8 p refs
(Contract W-7405-eng-36)
(DE82-014116; LA-9226) Avail: NTIS HC A02/MF A01

Two Light-Weight Radioisotope Heater Units were exposed to thermal ramps simulating atmospheric reentry. The helium release rates were measured during each test and modeled after simple diffusion theory. The reentry pulses did not result in swelling of the claddings or degradation of fuel pellets. DOE

N83-23148# Los Alamos Scientific Lab., N. Mex.
PROCEEDINGS OF THE 15TH LAMPF USERS GROUP MEETING
Donald R. F. Cochran, comp. Mar. 1982 137 p refs Meeting held in Los Alamos, N. Mex., 2-3 Nov. 1981
(Contract W-7405-eng-36)
(DE82-013765; LA-9260; CONF-811188) Avail: NTIS HC A07/MF A01

The Fifteenth LAMPF Users Group Meeting was held November 2-3, 1981 at Clinton P. Anderson Meson Physical Facility. The program of papers scheduled to be presented was amended to include a Report from Washington by Clarence R. Richardson, US Department of Energy. The general meeting ended with a round-table working group discussion concerning the Planning for a Kaon Factory. Individual items from the meeting were prepared separately for the data base. DOE

74 OPTICS

Includes light phenomena.

N83-23149# Merlin Gerin, Grenoble (France).
MEASUREMENT OF THE DISPLACEMENT VELOCITY OF AN ARC ON CONTACT MATERIALS USING FIBER OPTICS [MESURE DE LA VITESSE DE DEPLACEMENT D'UN ARC SUR LES MATERIAUX DE CONTACT A L'AIDE DE FIBRES OPTIQUES]
J. Ambier Dec. 1981 10 p In FRENCH Presented at 10th Intern. Congr. on Phenomenes de Contacts Electriques, Budapest
(Cahiers-Techniques-119) Avail: NTIS HC A02/MF A01

Tests on low voltage circuit breakers established that at the moment of breaking the electric arc is displaced more or less rapidly according to the composition of the contact materials, and the thermal stress and the current limited by the circuit are more or less increased. It is desirable to select materials for which the speed of arc displacement is highest for use in a simple and robust device which allows repeated measurements for statistical studies. Fiber optics is used to construct an apparatus which meets the desired criteria and reveals the differences of speed as a function of the material. Transl. by A.R.H.

N83-23150*# Arizona Univ., Tucson. Lunar and Planetary Lab.
DEVELOPMENT OF A CLEAN OPTICAL TELESCOPE Final Report, 15 Nov. 1981 - 14 Nov. 1982
Robert A. Brown 15 Apr. 1983 24 p refs
(NAGw-262)
(NASA-CR-170193; NAS 1.26:170193) Avail: NTIS HC A02/MF A01 CSCL 20F

Particulate contamination on astronomical mirrors degrades performance in two ways: by information loss by extinction of light; and background and noise from scattering, especially forward or Fraunhofer scattering. These effects were not generally understood, and an ambitious pilot program was outlined to measure particulate effects on telescope optical performance; develop prophylactic and cleaning procedures suitable for ground-based observatories; investigate by computational modeling and effects on telescopes in space; and communicate the results and concerns within the astronomical community. Author

N83-23151# Illinois Univ., Chicago. Dept. of Physics.
PICOSECOND ULTRAVIOLET PULSES FOR HIGH BRIGHTNESS xuv GENERATION Final Report, 1 Jul. - 31 Dec. 1981
H. Pummer, H. Egger, and C. K. Rhodes Mar. 1982 31 p refs
(Contract DE-AS02-79ER-10350)
(DE82-011949; DOE/ER-10350/2) Avail: NTIS HC A03/MF A01

The development of high-spectral-brightness rare-gas-halogen lasers is an important step towards the efficient generation of extreme ultraviolet and soft X-ray coherent radiation. Such lasers have been developed at 248 nm and at 193 nm, with 10 nsec

duration and diffraction-limited divergence. Also, at 10 mJ, 10 psec system was developed at 193 nm. Extreme ultraviolet radiation (64 to 83 nm) was generated from all these lasers, with efficiency of up to approximately 10 to the minus 5th power. Further improvements on the psec ArF* laser hold the promise of generating radiation of even shorter wavelengths, with a wide spectrum of applications in fundamental as well as applied research. DOE

N83-23152# Sandia Labs., Albuquerque, N. Mex. Photometrics and Optical Development Div.
SELECTED OBSERVATIONS PERTAINING TO VARIOUS TARGETS USED IN PHOTO-OPTICAL INSTRUMENTATION AT SANDIA NATIONAL LABORATORIES
Irvin W. Lenz Aug. 1982 27 p Presented at the 26th Tech. Symp. and Exhibition of the Intern. Soc. for Optical Eng., San Diego, Calif., 21 Aug. 1982
(Contract DE-AC04-76DP-00789)
(DE83-001274; SAND-82-1491C; CONF-820822-14) Avail: NTIS HC A03/MF A01

The effects of paint colors and patterns applied to the bodies of missiles on the photographic images obtained during the flight testing of missiles are discussed with illustrations, and the types of targets, cameras, and target illumination used for obtaining this photographic data are described. DOE

N83-23153# Sandia Labs., Albuquerque, N. Mex.
OPTICAL PROPERTIES OF GaP/GaAs SUB X P SUB 1-X
P. L. Gourley, R. M. Biefeld, G. C. Osbourn, and I. J. Fritz 1982 7 p refs Presented at the Intern. Symp. on GaAs and Related Compounds, Albuquerque, N. Mex., 20 Sep. 1982
(Contract DE-AC04-76DP-00789)
(DE83-000316; SAND-82-1297C; CONF-820960-4) Avail: NTIS HC A02/MF A01

Using optical absorption, photocurrent spectroscopy, and photoluminescence, MOCVD-grown strained-layer superlattices composed of thin (100-300 A) alternating layers of lattice-mismatched (up to a few percent) GaP and to GaAs/sub x/P/sub 1-x/ with $x = 0.44$ and 0.26 are studied. For $x < 0.5$ these structures are expected to exhibit direct transitions due to zone folding, even though the individual layer materials both have indirect gaps. The observed energies and strengths of the SLS optical transitions are consistent with the zone center band structure predicted for these particular samples, although the absorption strength near the band edge is weakened due to spatial separation of electrons and holes. DOE

N83-23154# Sandia Labs., Albuquerque, N. Mex.
DIAGNOSING LIGHT ION BEAM DIODES
C. W. Mendel, Jr. 1982 26 p refs Presented at the Workshop on Diagnostics for Fusion Reactor Conditions, Varenna, Italy, 6 Sep. 1982
(Contract DE-AC04-76DP-00789)
(DE82-021082; SAND-82-1252C; CONF-820944-4) Avail: NTIS HC A03/MF A01

This lecture begins with a discussion of diagnostics in ion beam diodes. This will include electromagnetic measurements, measurements of the electron cloud, and measurements of anode plasmas. A few minutes will be spent on diagnostics of distributed ion sources required for one class of ion diodes, the plasma-filled versions, which require high-density, highly ionized sources of very uniform plasma. The measurements of the beam characteristics will then be discussed. This will be broken into two regions; the region near the diode where diagnostics are generally extensions of those used in other fields; and the region near focus where new diagnostics have been developed. DOE

N83-23155# Sandia Labs., Albuquerque, N. Mex. Advanced Electronics Technology Div.
TERMINATION OF PLASTIC-CLAD FIBER
W. R. Nance Mar. 1982 27 p refs
(Contract DE-AC04-76DP-00789)
(DE82-014533; SAND-81-2135) Avail: NTIS HC A03/MF A01

The major problems associated with terminations of plastic-clad silica including selecting the proper connector and optimizing the terminating procedures are addressed. The sources of losses in the connectors are summarized and typical loss values are given for four connectors which were tested. DOE

N83-22305*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TEST FOR CONTAMINATION OF MgF2 - COATED MIRRORS
Alan N. Bunner (Perkin-Elmer Corp.), John-David Bartoe (Naval Research Lab.), and Jack Triolo *In* Systematics General Corp. The Shuttle Environ. Workshop Feb. 1983 7 p (For primary document see N83-22289 12-16)
Avail: NTIS HC A15/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N83-23156# Nagoya Univ. (Japan). Inst. of Plasma Physics.
GENERATION OF ASTRON-SPHERATOR CONFIGURATION
Kazumichi Narihara, Mitsuru Hasegawa, Yukihiro Tomita, Tetsuya Tsuzuki, Kuninori Sato, and Akihiro Mohri Jan. 1983 25 p refs (IPPJ-621) Avail: NTIS HC A02/MF A01

It was experimentally demonstrated that the Astron-Spherator configuration is formed by injecting a pulsed relativistic electron beam in a toroidal device SPAC-VI with external toroidal and vertical magnetic fields. A plasma is confined in the extended magnetic region produced by a slender core of current carrying energetic electrons. This configuration continued for 40 ms without fatal instabilities. M.G.

N83-23157# Nagoya Univ. (Japan). Inst. of Plasma Physics.
THE BEHAVIOUR OF POPULATION IN A PLASMA INTERACTING WITH AN ATOMIC GAS
Utaro Furukane (Ehime Univ., Japan) and Toshiatsu Oda (Hiroshima Univ., Japan) Jan. 1983 35 p refs
(IPPJ-622) Avail: NTIS HC A03/MF A01

The processes leading to population inversion in a recombining hydrogen plasma which is interacting with a cool and dense neutral hydrogen gas are investigated by using the rate equations on the basis of the CR model and the energy equation for electrons, ions, and neutral particles. The quasi-steady state approximation is used only for the levels higher than a certain level which is not the first excited level. The calculations show that the quasi-steady state cannot be realized while intense energy-flows due to the collisional processes exist between different kinds of particles such as the electrons and the ions in the plasma. The population inversion is realized only in the quasi-steady state following the transient phase. The effects of the initial conditions of the hydrogen plasma and the introduced neutral hydrogen gas on the overpopulation density are also discussed. M.G.

N83-23158# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ADVANCED FUSION REACTORS
J. M. Dawson (California Univ., Los Angeles) Jan. 1983 72 p refs Lectures held at Nagoya, Japan, 20-22 Oct. 1982
(IPPJ-623) Avail: NTIS HC A04/MF A01

Some ideas associated with alternate fuels, particularly nonneutron producing reactions are discussed as well as possible methods for achieving them. The use of a polarized nuclei in a fusion reactor, the maintenance of current in a Tokamak using synchrotron radiation, and the heating of a Tokamak using MeV singly ionized ions of Li or some heavier element are discussed. A.R.H.

N83-23159# Science Applications, Inc., Boulder, Colo. Plasma Research Inst.
MAGNETIC-FIELD ERRORS IN BUMPY TORUS CONFIGURATIONS

R. D. Hazeltine and P. J. Catto Oct. 1982 18 p refs
(Contract DE-AC03-76ET-53057)
(DE83-002651; SAI-254-82-282-LJ; PRI-54) Avail: NTIS HC A02/MF A01

The effects of magnetic field errors in a bumpy torus confinement device are studied. The analysis relies on large aspect-ratio and near-axis approximations, but includes toroidal effects and allows for any shape of the magnetic field bumps. The main features of the present results agree with those of previous numerical studies. However, the analysis of field line trajectories can be made surprisingly explicit, and reveals some features which have not been anticipated. DOE

N83-23160# Texas Univ., Austin. Inst. for Fusion Studies.
FINITE-LARMOR-RADIUS STABILITY THEORY OF EBT PLASMAS
H. L. Berk, C. Z. Cheng (Princeton Plasma Physics Lab., N.J.), M. N. Rosenbluth, and J. W. VanDam Nov. 1982 41 p refs
(Contract DE-FG05-80ET-53088)
(DE83-003498; DOE/ET-53088/69; IFSR-69) Avail: NTIS HC A03/MF A01

An eikonal ballooning mode formalism is developed to describe curvature driven modes of hot electron plasmas in bumpy tori. The formalism treats frequencies comparable to the ion cyclotron frequency, as well as arbitrary finite Larmor radius and field polarization, although the detailed analysis is restricted to E/sub parallel/ = 0. Moderate hot electron finite Larmor radius effects are found to lower the background beta core limit, whereas strong finite Larmor radius effects produce stabilization. DOE

N83-23161# Texas Univ., Austin. Inst. for Fusion Studies.
DRIFT WAVES IN A STELLARATOR
A. Bhattacharjee, J. E. Sedlak, P. L. Similon, M. N. Rosenbluth, and D. W. Ross Nov. 1982 12 p refs
(Contract DE-FG05-80ET-53088)
(DE83-003861; DOE/ET-53088/73; IFSR-73) Avail: NTIS HC A02/MF A01

The eigenmode structure of drift waves in a straight stellarator using the ballooning mode formalism is investigated. The electrons are assumed to be adiabatic and the ions constitute a cold, magnetized fluid. The effective potential has an overall parabolic envelope but is modulated strongly by helical ripples along it. Two classes of solutions were found: those that are strongly localized in local helical wells, and those that are weakly localized and have broad spatial extent. The weakly localized modes decay spatially due to the existence of Mathieu resonances between the periods of the eigenfunction and the effective potential. DOE

N83-23162# Sandia Labs., Albuquerque, N. Mex.
SANDIA TECHNOLOGY
Oct. 1982 28 p
(Contract DE-AC04-76DP-00789)
(DE83-004127; SAND-82-1398-Vol-6-No-1) Avail: NTIS HC A03/MF A01

A review of Sandias' inertial fusion program is given. The Particle Beam Fusion Accelerator is described. DOE

N83-23163# Sandia Labs., Albuquerque, N. Mex. Beam Experiments Div.
ANALYTIC THEORY OF SERIES-FIELD-COIL ION DIODES
C. W. Mendel, Jr. Oct. 1982 53 p refs
(Contract DE-AC04-76DP-00789)
(DE83-002630; SAND-82-0304) Avail: NTIS HC A04/MF A01

Ion diodes suited to inertially confined fusion research conduct very high currents. The magnetic fields due to these currents are comparable to the fields used to provide magnetic insulation of electrons. Because these self-fields are necessarily high at the diode boundary where the power is applied, and are zero at some other part of the diode away from the power feed, these diodes have generally been treated theoretically by two dimensional particle in cell computer simulations. We have found a special class of ion diodes employing series magnetic field coils which can be described by a one dimensional model. These diodes are highly amenable to treatment by analytic theory, and therefore are easily designed and scaled to multiterrawatt systems. Many features of these diodes make them very attractive as drivers for inertial confinement fusion research. Theoretical analysis of this class, including magnetic field configuration and field coil design, electron drifts, diode efficiency, and ion focusing is presented. DOE

N83-23164# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
ELMO BUMPUS TORUS PROOF OF PRINCIPLE, PHASE 2, TITLE 1 REPORT. VOLUME 8: DEVICE UTILITIES
D. T. Erickson 26 Feb. 1982 214 p
(Contract W-7405-eng-26)
(DE83-001872; ORNL/Sub-81-21099/1-08) Avail: NTIS HC A10/MF A01

The device enclosure provides an environmentally controlled and biologically shielded space for the device toroidal vessel and ancillary equipment. Design provisions for personnel safety meet the requirements listed in the approved preliminary safety analysis report. The device enclosure contains two (2) levels for personnel access to gyrotron/microwave distribution, diagnostic, and toroidal vessel systems. It provides for personnel and equipment ingress/egress, and includes lighting, emergency lighting, and fire detection/protection. Structural support to the device support structure are provided. The design of the device enclosure penetrations and diagnostic access windows have sufficient flexibility to accommodate planned upgrades. The device enclosure provides penetrations through the walls and floors for diagnostics, power cables, instrumentation cables, water lines, ICRH transmission cables, HVAC ducts, ECRH waveguides, and vacuum cryogenic lines. DOE

N83-23165# Oak Ridge National Lab., Tenn.
THE ND6600 COMPUTER IN FUSION-ENERGY RESEARCH
K. G. Young Dec. 1982 66 p refs
(Contract W-7405-eng-26)
(DE83-005160; ORNL/TM-8107) Avail: NTIS HC A04/MF A01

The ND6600, a computer-based multichannel analyzer with eight ADCs used to acquire plasma X-ray data, is discussed. The nuclear data system and the information necessary for the user to acquire, display, and record data are introduced. The manual also guides the programmer in the hardware and software maintenance of the system. DOE

N83-23166# Los Alamos Scientific Lab., N. Mex.
GENERATION OF VACUUM ULTRAVIOLET RADIATION BY PLASMA NONLINEARITIES
R. L. Carman and C. H. Aldrich 1982 19 p refs Presented at the Optical Soc. of Am. Topical Meeting on Laser Techniques for Extreme Ultraviolet Spectry., Boulder, Colo., 8-10 Mar. 1982
(Contract W-7405-eng-36)
(DE82-011978; LA-UR-82-601; CONF-820336-4) Avail: NTIS HC A02/MF A01

Numerical simulations of the relevant plasma hydrodynamics were performed. They indicate that ten (19.3 micrometers) or more harmonics of an ArF laser should be generated at high efficiency in a high irradiance solid target plasma interaction experiment. DOE

N83-23167# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Magnetic Fusion.
FUTURE ENGINEERING NEEDS OF MAGNETIC FUSION
1982 108 p refs
(Contract DE-FG01-82ER-54008)
(DE83-004216; DOE/ER-54008/T1) Avail: NTIS HC A06/MF A01

As the investigation of magnetic fusion proceeds from experimentation toward development, it will encounter engineering challenges of considerable complexity. Magnetic fusion, the releasing of energy from controlled nuclear reactions involving certain of the light elements, offers the possibility of a new, multipurpose energy source. One such purpose, the generation of electrical power, is attractive for the future to complement, and

perhaps ultimately to replace, fossil and uranium fuel resources that may have become costly through scarcity or other constraints. Magnetic fusion may also come to be exploited commercially in uses stemming from the intrinsic characteristics of the thermonuclear reaction, that is to say, inexpensively producing copious, energetic neutrons for a not yet fully imagined spectrum of applications. DOE

N83-23168# Department of Energy, Washington, D. C. Office of Fusion Energy
REPORT OF PLANNING WORKSHOP ON FLUCTUATIONS AND ANOMALOUS TRANSPORT IN TOKAMAKS
Oct. 1982 30 p refs Presented at the Workshop on Fluctuation and Anamalous Transport to Tokamaks, College Park, Md., 7-8 May 1981 Prepared in cooperation with Maryland Univ., College Park
(DE83-001154; CONF-8205118) Avail: NTIS HC A03/MF A01

The workshop was divided into three sections; review of experiments on fluctuations in Tokamaks, review of theories of anomalous transport, and discussion of directions for future research and experimental/theoretical collaboration. DOE

N83-23169# Texas Univ., Austin. Fusion Research Center.
DISCRETE ALFVEN EIGENMODE SPECTRUM IN MAGNETOHYDRODYNAMICS
Swadesh M. Mahajan (Oak Ridge National Lab.), David W. Ross, and Gwo-Liang Chen Jun. 1982 24 p refs
(Contract DE-AC05-76ET-53036)
(DE83-000162; DOE/ET-53036/38) Avail: NTIS HC A02/MF A01

The conditions for the existence of global Alfven eigenmodes below the continuum are investigated, and an analytical dispersion relation describing the modes is obtained. Gradients of the equilibrium current (magnetic shear), and finite omega/omega/sub ci/ effects are responsible for these modes which could play an important part in Alfven wave heating of Tokamak plasmas. DOE

N83-23170# Wisconsin Univ., Madison. Dept. of Physics.
EXPERIMENT AND THEORY OF A DRIFT WAVE IN THE LEVITATED OCTUPOLE Ph.D. Thesis
Evan Andrew Rose 1982 155 p refs
(Contract DE-AC02-76ET-53051)
(DE82-022211; DOE/ET-53051/45) Avail: NTIS HC A08/MF A01

A very coherent 30 kHz drift wave is observed in the Levitated Toroidal Octupole. The density and floating potential fluctuations have a well defined spatial structure in the poloidal magnetic field. Radially the wave has a standing wave structure with amplitude peaked in regions of locally bad magnetic curvature. Poloidally the wave has a standing wave structure with odd symmetry, nodes are located in the regions of locally good manetic curvature. The wave toroidally in the electron diamagnetic drift direction with a wave length of 20 centimeters. No changes occur in the wave structure as the plasma is varied over three orders of magnitude in density and beta. DOE

N83-23171# Illinois Univ., Urbana. Charged Particle Research Lab.
FABRICATION OF CRYOGENIC INERTIAL-CONFINEMENT-FUSION TARGETS USING TARGET FREE-FALL TECHNIQUE
Kyekyoon Kim and Matthew J. Murphy Apr. 1982 98 p refs
(Contract W-7405-eng-48)
(DE83-000598; UCRL-15463; Rept-2-82) Avail: NTIS HC A05/MF A01

Techniques for fabricating cryogenic inertial confinement fusion targets (i.e., spherical shells containing a uniform layer of DT ice) are investigated using target free fall concept. Detection and characterization of the moving targets are effected by optoelectronic means, of which the principal is an RF ac-interferometer. This interferometer system demonstrates for the first time, the speed capabilities of the phase modulation ac-interferometry. New techniques developed for handling, holding, launching, and transporting targets are also described. Results obtained at both room and cryogenic temperatures are presented. DOE

N83-23172# California Univ., Livermore. Lawrence Livermore Lab.
PROCEEDINGS OF THE FOURTH SYMPOSIUM OF THE PHYSICS AND TECHNOLOGY OF COMPACT TOROIDS
R. F. Post, ed. and W. C. Turner, ed. 11 Jun. 1982 251 p refs Symp. held at Livermore, Calif., 27-29 Oct. 1981 Sponsored by DOE
(DE82-019828; CONF-811087) Avail: NTIS HC A12/MF A01

Theory and experiments with field reversed theta pinch and spheromaks are described as well as the physics of toroidal plasmas. Traveling mirror adiabatic compressors, analytic field reversed mirror equilibrium, anomalous diffusion; rotating reliativistic electron beams, and MeV and GeV prospects for producing a large ion layer configuration for fusion power are also discussed. A.R.H.

N83-23173# Brookhaven National Lab., Upton, N. Y.
HYFIRE: A TOKAMAK/HIGH-TEMPERATURE ELECTROLYSIS SYSTEM
J. A. Fillo, J. R. Powell, R. Benenati, T. C. Varljen, J. W. H. Chi, and J. S. Karbowski 1982 9 p refs Presented at the World Hydrogen Energy Conf., Pasadena, Calif., 13 Jun. 1982 Prepared in cooperation with Westinghouse Electric Corp., Pittsburgh, Pa.
(Contract DE-AC02-76CH-00016)
(DE82-013851; BNL-31072) Avail: NTIS HC A02/MF A01

The HYFIRE studies to date have investigated a number of technical approaches for using the thermal energy produced in a high-temperature Tokamak blankets to provide the electrical and thermal energy required to drive a high-temperature (> 1000 C) water electrolysis process. Current emphasis is on two design points, one consistent with electrolyzer peak inlet temperatures of approximately 1300 C, which is an extrapolation of present experience, and one consistent with a peak electrolyzer temperature of 1100 C. This latter condition is based on current laboratory experience with high-temperature solid electrolyte fuel cells. Our major conclusion to date is that the technical integration of fusion and high-temperature electrolysis appears to be feasible and that overall hydrogen production efficiencies of 50 to 55% seem possible. DOE

N83-23174# Oak Ridge National Lab., Tenn. Analytical Chemistry Div.
SIMULTANEOUS OPERATION OF A POLYCHROMATOR AND MONOCHROMATOR ON A SINGLE-SOURCE INDUCTIVELY COUPLED PLASMA EMISSION SYSTEM
J. M. Keller, D. R. Heine, and C. W. Rogers 1982 4 p Presented at the Spring DECUS Symp., Atlanta, 10 May 1982
(Contract W-7405-eng-26)
(DE82-015695; CONF-820515-7) Avail: NTIS HC A02/MF A01

Inductively coupled plasma atomic emission spectroscopy (ICP-AES) is a popular analytical technique for routine multielement analysis. An argon plasma, which is sustained by a radio frequency field, serves as the atomization excitation source for emission spectroscopy. With commercial instrumentation the atomic emission is monitored with either a direct reader (polychromator) or a scanning monochromator. Software for simultaneous operation of both the polychromator and the monochromator with a single plasma source is developed. The hardware for this system includes an LSI-11/23 as the main computer with satellite FALCON SBC-11/21 single-board computers for hardware control and data acquisition. TSX-Plus, a multi-user operating system, is being employed for software development on the LSI-11/23. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N83-23175# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A CRYSTALLINE CLUSTER MODEL OF COPPER CHLORIDE ELECTRONIC STRUCTURE

Paulo S. Guimaraes and Nelson de Jesus Parada Feb. 1983 22 p refs Submitted for publication

(INPE-2656-PRE/269) Avail: NTIS HC A02/MF A01

A crystalline cluster calculation was performed to obtain the electronic structure of Copper Chloride. Several clusters were used and it was shown that the energy spectra so obtained do not differ significantly and reproduce the experimental data as well as the better existing band structure calculations. The main sources of errors subsisting in the crystalline cluster model also were investigated. The muffin-tin approximation introduces effects on the cluster bands smaller than those resulting from the X sub alpha approximation or changes in the cluster size. However, for highly ionic crystals such as CuCl, the convergence of the bands with the cluster size is very fast and it was observed that for these highly ionic crystals the cluster size effects are not large enough to modify the qualitative behavior of the cluster energy spectrum. Author

N83-23176# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

IMPURITY STATES IN N-TYPE MANY-VALLEY SEMICONDUCTORS

M. Fabbri and A. Ferreira daSilva Mar. 1983 15 p refs Presented at Primeira Escola Brasil. de Fisica de Semicondutores Submitted for publication

(INPE-2669-PRE/279) Avail: NTIS HC A02/MF A01

A self-consistent unrestricted Hartree Fock Roothan cluster calculation that takes into account the many valley effects of the host conduction band was performed to investigate the microscopic structure of impurity bands in doped semiconductors. The measure of localization was carried out through the inverse participation ratio (IPR). While the lower and the upper Hubbard bands are well defined at low concentrations, the donor excitonic states are important at higher concentration where the upper Hubbard band is pushed into the conduction band. The Mott Hubbard Anderson model thus modified can still explain almost all the experimental results. This cluster model allows numerical investigations of the thermodynamic, magnetic and transport properties. Author

N83-23177# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A CRYSTALLINE CLUSTER METHOD FOR DEEP IMPURITIES IN INSULATORS

P. S. Guimaraes Mar. 1983 10 p refs Presented at the 1st Escola Brasil. de Fisica de Semicondutores Submitted for publication

(INPE-2668-PRE/278) Avail: NTIS HC A02/MF A01

An ab initio self-consistent field crystalline cluster approach to the study of deep impurity states in insulators is proposed. In spite of being a cluster calculation, the interaction of the impurity with the crystal environment is fully taken into account. The present representation of the impurity state is, at least as precise as the crystalline cluster representation of the pure crystal electronic structure. The procedure has been tested by performing the calculation of the electronic structure of the U center in a sodium chloride crystal, and it was observed that the calculated gamma sub one to gamma sub fifteen absorption energy is in good agreement with experiment. Author

N83-23178# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ELECTRON CORRELATION IN NARROW BAND SYSTEMS

R. Kishore Mar. 1983 11 p refs Presented at the 1st Escola Brasil. de Fisica de Semicondutores Submitted for publication

(INPE-2667-PRE/277) Avail: NTIS HC A02/MF A01

The effect of the electron correlations in narrow bands, such as d(f) bands in the transition (rare earth) metals and their compounds and the impurity bands in doped semiconductors, are studied. The narrow band systems are described by the Hubbard Hamiltonian. By proposing a local self-energy for the interacting electrons, we found that our results are exact in both atomic and band limits and reduce to the Hartree Fock results for U/delta yield 0, where U is the intra-atomic Coulomb interaction and delta is the bandwidth of the noninteracting electrons. For the Lorentzian form of the density of states of the noninteracting electrons, our approximation turns out to be equivalent to the third Hubbard approximation. A simple argument, based on the mean free path obtained from the imaginary part of the self energy, shows how the electron correlations can give rise to a discontinuous metal-nonmetal transition as proposed by Mott. The band narrowing and the existence of the satellite below the Fermi energy in Ni, found in photoemission experiments, can also be understood. Author

N83-23179# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ON THE VALIDITY OF THE CLUSTER METHOD FOR CRYSTALS

P. S. Guimaraes and Luiz G. Ferreira Mar. 1983 9 p ref Presented at the 1st Escola Brasil. de Fisica de Semicondutores Submitted for publication

(INPE-2680-PRE/284) Avail: NTIS HC A02/MF A01

A formal mathematical background is developed in such a way that it determines the necessary conditions that a cluster must satisfy to reproduce, accurately, the main features of the band structure of an infinite crystal. It is shown that, if such conditions are satisfied, the cluster energy band structure is a true image of the crystal one. Author

N83-23180# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

INFLUENCE OF CONDUCTION STATES ON THE ELECTRONIC PROPERTIES OF DOPED SEMICONDUCTORS [INFLUENCIA DOS ESTADOS DE CONDUCAO SOBRE AS PROPRIEDADES ELETRONICAS DE SEMICONDUTORES DOPADOS]

L. F. Perondi and R. Kishore Mar. 1983 17 p refs In PORTUGUESE; ENGLISH summary Presented at the 1st Brazilian Acad. of Semicond. Phys. Submitted for publication

(INPE-2666-PRE/276) Avail: NTIS HC A02/MF A01

A model for the calculation of electronic properties of doped semiconductors, that considers the presence of the conduction band of the host material, is proposed. The model is derived from the standard basis operator form of the extended Anderson model. Disorder is considered through the use of the single site theory of Matsubara and Toyozawa. The numerical density of states and specific heat of uncompensated phosphorus doped silicon is calculated as a function of impurity concentration for various values of the hybridization parameter. M.G.

N83-23181# Fairchild Camera and Instrument Corp., Palo Alto, Calif. Advanced Research and Development Lab.

PROCESS VARIABLE DEPENDENCE AND INTERRELATIONSHIP BETWEEN AVALANCHE CHARGE INJECTION AND RADIATION INDUCED CARRIER TRAPPING IN THERMAL OXIDES Final Technical Report

R. R. Razouk, B. E. Deal, and S. L. Pressacco Apr. 1982 107 p refs

(Contract N00014-79-C-0297; ARPA Order 3721)

(AD-A122379) Avail: NTIS HC A06/MF A01 CSCL 20/8

The primary objective of this program is the investigation of the effects of processing variables on the trapping characteristics of injected charge carriers in thermal silicon dioxide. In addition, the nature and process dependence of avalanche injected trapped charges will be compared to those produced by ionizing radiation in dioxide. In addition, the nature and process dependence of avalanche injected trapped charges will be compared to those produced by ionizing radiation in identical oxides. The results obtained from this program should help in the determination of optimum process conditions for minimizing hot carrier trapping in VLSI device structures and in the establishment of accelerated test procedures for the evaluation of radiation trapping properties

of thermal oxides. Characterization of the process dependence of avalanche injected electrons and holes in thermally grown silicon dioxide has been caried out. Process parameters investigated include oxidation temperature (800, 900, 1000, and 1100 C) oxidation ambient (O2, H2O and O2/HCl); oxidation pressure (1,5 and 10 atm), post-oxidation in situ anneal ambient (N2, Ar), cooling ambient (O2, N2, Ar, and H2O), cooling rates (3 sec, 2 min, and 10 min), pre-metallization anneal in hydrogen, post-metallization anneal ambients (N2, H2, N2/H2), substrate orientation (100) and (111)), oxide thickness, polycrystalline silicon field plate deposition and process related radiation exposure (election beam, laser beam, and ion implantation). Results indicate basic differences between the process dependence of electron traps and that of hole traps. GRA

N83-23182# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
FACETING OF TILT BOUNDARIES IN NIO
M. Vaudin, M. Ruehle, and S. L. Sass Nov. 1982 27 p refs
(Contract DE-AC02-81ER-10956)
(DE83-003098; DOE/ER-10956/2) Avail: NTIS HC A03/MF A01

The structure of low angle tilt boundaries in NiO was studied using an electron microscope technique that is sensitive to the change in mean inner potential at the core of dislocations. The two boundaries examined were both faceted, one in particular having a complex dislocation content in facets with a period of approx. 8.8 nm. Using the experimentally determined rotation axis, angle and boundary plane, Bollman's O-lattice theory was applied to determine the geometry and dislocation content of the facets. The predictions of the theoretical analysis were in excellent agreement with all details of the observed geometry and dislocation content, demonstrating that Bollmann's theory is valid to predict the detailed structure of tilt boundaries in NiO. It is suggested that in NiO a tilt boundary with an arbitrary rotation axis will be faceted. DOE

N83-23183# Oak Ridge National Lab., Tenn. Fusion Energy Div.
MAXIMUM ALLOWABLE RESISTIVE ZONE IN A METASTABLE SUPERCONDUCTOR
L. Dresner Oct. 1982 24 p refs
(Contract W-7405-eng-2)
(DE83-002585; ORNL/TM-8394) Avail: NTIS HC A02/MF A01

If a metastable superconductor (i.e., not cryostable) has a small resistive zone (due, e.g., to a manufacturing defect), it may quench spontaneously at high transport current. Related questions answered are how large is the maximum allowable resistive zone and what is the effect on stability of a zone smaller than the maximum allowable one. DOE

N83-23184# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
GRAIN-BOUNDARY STRUCTURE AND PROPERTIES IN POLY-CRYSTALLINE SILICON
Y. S. Tsuo, R. W. Hardy, and J. B. Milstein Sep. 1982 8 p refs Presented at the 16th Photovoltaic Spec. Conf., San Diego, Calif., 27-30 Sep. 1982
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-001727; SERI/TP-211-1757; CONF-820906-28) Avail: NTIS HC A02/MF A01

The grain boundary properties of polycrystalline silicon solar cell materials are reviewed. Of particular importance are the improvements in hydrogen grain boundary passivation techniques that have not only shortened the required passivation treatment time to only a few minutes but also demonstrated the ability to significantly increase polycrystalline silicon solar cell efficiencies for both large grained and small grained materials. DOE

N83-23185# Oregon State Univ., Corvallis. Dept. of Electrical and Computer Engineering.
INVESTIGATION OF THE ELECTRICAL AND OPTICAL PROPERTIES OF ORGANOMETALLIC VAPOR-PHASE EPITAXIAL AI/SUB x/Ga/SUB 1-x/As AND AI/SUB X/Ga/SUB 1-x/As/GaAs INTERFACES IN SOLAR CELLS Progress Report, 16 Dec. 1981 - 1 Dec. 1982
P. K. Bhattacharya 1982 52 p refs
(Contract DE-AT06-81ER-10939)
(DE83-004939; DOE/ER-10939/2) Avail: NTIS HC A04/MF A01

Several fundamental properties in the organometallic vapor phase epitaxial (OMVPE) Al/sub x/Ga/sub 1-x/As alloys were revealed and interpreted. Dominant electron traps in these alloys were identified for the first time. A consistent behavior of the deep traps in these materials, where the trap activation energy and capture cross section show definite trends, were explained by the lattice relaxation model. The results also throw light on the physicochemical origin of a deep trap labeled EL2 in these materials. Low field mobilities in the alloys were measured as a function of temperature in alloys with 0 less than or equal to x less than or equal to 0.8. For x less than or equal to 0.3 the mobility values can be interpreted by the known scattering theories. Abnormally high mobilities in alloys with x less than or equal to 0.35 are being observed for the first time and were interpreted by considering the modulation doping process. This effect has important effects on the performance of cascade solar cell. Photoluminescence data indicate the presence of C, Si, Ge and Cu as the major impurities in OMVPE Al/sub x/Ga/sub 1-x/As. DOE

N83-23186# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
FAR-INFRARED STUDIES ON SUPERCONDUCTORS AND HEAT-CAPACITY STUDIES ON LIQUID CRYSTALS Progress Report, 19 Feb. 1981 - 30 Mar. 1982
Cheng-cher Huang 30 Mar. 1982 6 p refs
(Contract DE-AC02-79ER-10461)
(DE82-013549; DOE/ER-10461/3) Avail: NTIS HC A02/MF A01

Low temperature heat capacity was measured on one transforming V3Si sample. Results of one He-3 cooled bolometer for far infrared studies are presented. An important contribution in understanding the nature of two liquid crystal phase transitions, i.e., smectic A - smectic C (SmA-SmC) and SmA - hexatic B is included also. DOE

N83-23187# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
INVESTIGATION OF XPS OF SURFACE FEATURES OF SOME TITANATE MINERALS
S. Myhra, H. E. Bishop, and J. C. Riviere Jan. 1983 29 p refs (AERE-R10779) Copyright. Avail: Issuing Activity

Two Perovskites (CaTiO3 and BaRiO3), a Hollandite (BaAleTi6O116) and a Zironolite (ZrCaTi2O7) were investigated by XPS. All surface species were identified and fully quantified elemental profiles were obtained; the abundancies were in good agreement with the nominal stoichiometries. The Ti 2p spectral envelope for all minerals was affected by ion bombardment, as a result of reduction to states of lower valency. The two cubic perovskites were more resistant to ion modification than the non-cubic titanates. The shape of the Ca 2p spectral envelope was dependent on crystal structure as well as on ion bombardement. The other species exhibited no resoluable XPS features which could be related to crystalline or chemical environment. Author

N83-22649# Hokkaido Univ., Sapporo (Japan).
CRYSTALLOGRAPHIC ORIENTATION OF RECRYSTALLIZED GRAIN IN STRAINED SINGLE CRYSTAL OF ICE
Mutsumi Ohtomo and Gorow Wakahama *In its* Low Temp. Sci., Ser. A: Phys. Sci. 1982 p 1-11 refs (For primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

N83-22650# Hokkaido Univ., Sapporo (Japan).
REPEATED RECRYSTALLIZATION OF POLYCRYSTALLINE ICE
Maohuan Huang, Mutsumi Ohtomo, and Gorow Wakahama *In its* Low Temp. Sci., Ser. A.: Phys. Sci. 1982 p 13-23 refs (For

primary document see N83-22648 12-42)
Avail: NTIS HC A11/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N83-23188*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A CLASS OF NONIDEAL SOLUTIONS. 2: APPLICATION TO EXPERIMENTAL DATA
Frank J. Zeleznik and Leo F. Donovan Apr. 1983 55 p refs
(NASA-TP-1930; E-020; NAS 1.60:1930) Avail: NTIS HC A04/MF A01 CSCL 20M

Functions for the representation of the thermodynamic properties of nonideal solutions were applied to the experimental data for several highly nonideal solutions. The test solutions were selected to cover both electrolyte behavior. The results imply that the functions are fully capable of representing the experimental data within their accuracy over the whole composition range and demonstrate that many nonideal solutions can be regarded as members of the defined class of nonideal solutions. Author

N83-23189*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A CLASS OF NONIDEAL SOLUTIONS. 1: DEFINITION AND PROPERTIES
Frank J. Zeleznik Apr. 1983 43 p refs
(NASA-TP-1929; E-021; NAS 1.60:1929) Avail: NTIS HC A03/MF A01 CSCL 20M

A class of nonideal solutions is defined by constructing a function to represent the composition dependence of thermodynamic properties for members of the class, and some properties of these solutions are studied. The constructed function has several useful features: (1) its parameters occur linearly; (2) it contains a logarithmic singularity in the dilute solution region and contains ideal solutions and regular solutions as special cases; and (3) it is applicable to N-ary systems and reduces to M-ary systems (M < or = N) in a form-invariant manner. Author

N83-23190# Oklahoma Univ., Norman. School of Chemical Engineering and Materials Science.
DEVELOPMENT OF A THERMODYNAMIC PROPERTIES CORRELATION FRAMEWORK FOR THE COAL CONVERSION INDUSTRY, PHASE 2 Semiannual Report, 1 Sep. 1981 - 28 Feb. 1982
K. E. Starling, L. L. Lee, and K. H. Kumar 1982 16 p refs
(Contract DE-FG22-80PC-30249)
(DE82-009866; DOE/PC-30249/T3) Avail: NTIS HC A02/MF A01

A multiparameter corresponding states framework is being developed to predict the thermodynamic behavior of nonpolar, polar and associating coal fluids. A three parameter corresponding states correlation was modified and applied to nonpolar and slightly polar pure, binary and multicomponent coal fluid systems. Correlations were developed for obtaining the three corresponding states parameters for undefined mixtures. Techniques for converting distillation analysis for undefined mixtures into pseudocomponents were also provided. Additional parameters were required for characterizing the behavior of highly polar and associating compounds found in liquefied coal. An extension of the three parameters corresponding states correlation to a five parameter corresponding states correlation was made to predict the thermodynamic behavior of polar and associating pure coal fluids. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N83-23191# RAND Corp., Santa Monica, Calif.
CONSISTENCY AND PLAUSIBLE INFERENCE
J. R. Quinlan Oct. 1982 35 p refs
(P-6831) Avail: NTIS HC A03/MF A01

A seemingly simple uncertain inference problem is set out. Prospector, SRI's geological consultant program, is sketched as an example of a directed Bayesian architecture. A non-directed non-Bayesian architecture, INFERNO, sensitive to the consistency of information, is described. A new system called Ponderosa that performs uncertain inference by evidence division rather than by propagation of validity is introduced. Author

N83-23192# RAND Corp., Santa Monica, Calif.
RSK-MANAGEMENT PRACTICES IN LOCAL COMMUNITIES
Marshall W. Meyer and Kenneth A. Solomon Oct. 1982 54 p
(RAND/P-6821) Avail: NTIS HC A04/MF A01

The current state of risk-management practices in local communities in the United States is discussed and some alternatives to present policies are offered which are mainly implicit rather than explicit attempts to limit overall risks of death and injury due to technological and natural causes. All observations point toward the conclusion that local government officials have little understanding of, hence little concern for the quantity of risk posed for citizens by various hazards. If it seems desirable to place risk management decisions in the hands of local officials, then some capacity for risk quantification, hence comparison, must be developed. The bulk of the policy suggestions concern possible means through which this capacity might be augmented. A.R.H.

N83-23193*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DATA BASE MANGEMENT SYSTEM ANALYSIS AND PERFORMANCE TESTING WITH RESPECT TO NASA REQUIREMENTS Final Report
Elizabeth A. Martin, R. V. Sylto, Tom L. Gough (Business and Technological Systems, Inc., Seabrook, Md.), H. A. Huston (Business and Technological Systems, Inc., Seabrook, Md.), and J. J. Morone (Business and Technological Systems, Inc., Seabrook, Md.) 6 Aug. 1981 214 p refs
(NASA-TM-83942; NAS 1.15:83942) Avail: NTIS HC A10/MF A01 CSCL 05A

Several candidate Data Base Management Systems (DBM's) that could support the NASA End-to-End Data System's Integrated Data Base Management System (IDBMS) Project, later rescoped and renamed the Packet Management System (PMS) were evaluated. The candidate DBMS systems which had to run on the Digital Equipment Corporation VAX 11/780 computer system were ORACLE, SEED and RIM. Oracle and RIM are both based on the relational data base model while SEED employs a CODASYL network approach. A single data base application which managed stratospheric temperature profiles was studied. The primary reasons for using this application were an insufficient volume of available PMS-like data, a mandate to use actual rather than simulated data, and the abundance of available temperature profile data. Author

N83-23194# Harvard Univ., Cambridge, Mass. Center for Research in Computer Technology.

REAL TIME RESOURCE ALLOCATION IN A DISTRIBUTED SYSTEM

John H. Reif and Paul Spirakis Jun. 1982 38 p refs Presented at the ACM SIGACT-SIGOPS Symp. on Principles of Distributed Computing, Ottawa, Canada, Aug. 1982 Supersedes TR-06-82 (Contract N00014-80-C-0647; Grant NSF MCS-79-21024)
(AD-A122557; TR-18-82; TR-06-82) Avail: NTIS HC A03/MF A01 CSCL 05/1

In this paper we consider a resource allocation problem which is local in the sense that the maximum number of users competing for a particular resource at any time instant is bounded and also at any time instant the maximum number of resources that a user is willing to get is bounded. The problem may be viewed as that of achieving matchings in dynamically changing hypergraphs, via a distributed algorithm. We show that this problem is related to the fundamental problem of handshake communication (which can be viewed as achieving matchings in a dynamically changing graph, via distributed algorithms) in that an efficient solution to each of them implies an efficient solution to the other. We provide real-time solutions to the resource allocation problem (that is, we give distributed algorithms with real time response). We make essential use of probabilistic techniques as first used by (Rabin, 80b), where processes are allowed to make independent probabilization choices. On the other hand, no probability assumptions about the system behavior are made. GRA

N83-23195# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.

DOMAIN INDEPENDENT PLANNING: REPRESENTATION AND PLAN GENERATION

David Wilkins Aug. 1982 46 p refs
(Contract F49620-79-C-0188)
(AD-A123169; AFOSR-82-1074TR; TN-266) Avail: NTIS HC A03/MF A01 CSCL 05A

A domain independent planning program that supports both automatic and interactive generation of hierarchical, partially ordered plans is described and an improved formalism for representing domains and actions is presented. The formalism makes extensive use of constraints, provides efficient methods for representing properties of objects that do not change over time, allows specification of purposes for determining plan rationale, allows specification of resources, and provides the ability to express deductive rules about how the world works. The system deduces the effects of actions using deductive rules. The implications of allowing parallel actions in a plan or problem solution are discussed. New techniques for efficiently detecting and remedying harmful parallel interactions are presented. The most important of these techniques, reasoning about resources, is emphasized and explained. The system supports concurrent exploration of different branches in the search, making best-first search easy to implement. Meta-planning and its implications for domain independent planning are discussed in some detail, and primitive execution monitoring capabilities are described. GRA

N83-23196# Commerce Dept., Washington, D.C. Office of the Assistant General Counsel for Economic Affairs.

INFORMATION AND STEPS NECESSARY TO FORM RESEARCH AND DEVELOPMENT LIMITED PARTNERSHIPS

30 Nov. 1982 104 p
(PB83-131516) Avail: NTIS HC A06/MF A01 CSCL 05A

The structure, formation and operation of research and development limited partnerships (RDLP's) were reviewed. The (RDLP) is a type of business organization which makes it possible to form syndicates for venture capital for research and development. The RDLP is an alternative to the traditional sources of the funding for business research. The RDLP removes the limitations on R%D expenditures which arise naturally if R%D is funded out of a firm's retained earnings or from borrowed money. An RDLP can finance an existing firm's R%D, or can provide the seed money for a business start up by tapping the venture capital market. It offers an effective means of financing small and large scale projects. GRA

N83-23197# National Science Foundation, Washington, D.C.

NATIONAL PATTERNS OF SCIENCE AND TECHNOLOGY RESOURCES, 1982 Science and Technology Statistics, 1953-1982

Mar. 1982 90 p
(PB83-132787; NSF-82-319) Avail: NTIS HC A05/MF A01 CSCL 05A

Data on the dollar volume of research and development performance within each sector of the economy are presented. Sources of financing, numbers of scientists and engineers, international comparisons, and other economic characteristics of the Nation's science and technology effort are included. Author

N83-23213# Van Wyk and Louw, Inc., Pretoria (South Africa).

GASOLINE SHORTFALL MANAGEMENT

Victor Prins *In* CSIR Ann. Transportation Conv., Vol. 2 1982 23 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N83-23198* National Aeronautics and Space Administration, Washington, D. C.

NASA PATENT ABSTRACTS BIBLIOGRAPHY. A CONTINUING BIBLIOGRAPHY (SUPPLEMENT 22). SECTION 1: ABSTRACTS

Jan. 1983 79 p
(NASA-SP-7039(22)-Sect-1; NAS 1.21:7039(22)-Sect-1) Avail: NTIS HC $10.00 CSCL 05B

Abstracts are cited for 234 patents and patent applications introduced into the NASA scientific and technical information system during the period July 1982 through December 1982. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application. Author

N83-23199* National Aeronautics and Space Administration, Washington, D. C.

NASA PATENT ABSTRACTS BIBLIOGRAPHY. A CONTINUING BIBLIOGRAPHY (SUPPLEMENT 22). SECTION 2: INDEXES

Jan. 1983 364 p
(NASA-SP-7039(22)-Sect-2; NAS 1.21:7039(22)-Sect-2) Avail: NTIS HC $20.00 CSCL 05B

Entries for over 4000 patents and patent applications citations for the period May 1969 through December 1982 are listed. Subject, invention, source, number, and accession number indexes are included. Author

N83-23200# California Univ., Berkeley. Lawrence Berkeley Lab.

AN INTERACTIVE INDEXING-EDITING SYSTEM FOR DOE TECHNICAL INFORMATION CENTER

Barbara A. Cerny and J. Dennis Lawrence [1982] 12 p refs
(Contract W-7405-eng-48)
(DE82-008869; LBL-14049) Avail: NTIS HC A02/MF A01

A system to provide computer assisted aids to document indexing for the Department of Energy Technical Information Center Energy Information Data Base is being developed. The goal is to allow more efficient processing of documents and document surrogates by using interactive computer techniques rather than the current combination of manual indexing and batch computer processing. It draws on automatic indexing techniques, but includes the indexer as an integral element of the system; he is the decision-maker while the computer provides clerical support. This approach is transferable to other large production systems. Author

N83-23201# National Bureau of Standards, Washington, D.C. Library Div.
NBS SERIAL HOLDINGS 1982
Mary Lynn Kingston, ed. Aug. 1982 290 p Supersedes PB81-203739
(PB83-132704; PB81-203739; NBSIR-82-2575) Avail: NTIS HC A13/MF A01 CSCL 05B

This publication contains holdings information for approximately 4600 titles representing current and noncurrent journals, periodicals, annuals, memoirs, proceedings, and transactions. The holdings of the NBS Library and three collections specializing in fire research, standards, and diffusion in metals are represented. GRA

N83-23202# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
DATA BASE DIRECTIONS INFORMATION RESOURCE MANAGEMENT: STRATEGIES AND TOOLS Final Special Publication
Alan H. Goldine Sep. 1982 177 p refs Presented at Workshop of the Natl. Bureau of Standards and the Assoc. for Computing Machinery, Fort Lauderdale, Fla., 20-22 Oct. 1980; sponsored in part by Assoc. for Computing Machinery
(PB83-115634; NBS-SP-500-92; LC-82-600584) Avail: NTIS HC A09/MF A01 CSCL 05B

How managers can evaluate, select, and effectively use information resource management tools, especially data dictionary systems is considered. Four working panels met to discuss uses of the data dictionary system, IRM policies and controls, logical database design, and physical database design. GRA

N83-23203# Interior Dept., Washington, D.C. Office of Information Resources Management.
IRM (INFORMATION RESOURCES MANAGEMENT) LONG RANGE PLAN FY 1983-1987. VOLUME 1: EXECUTIVE SUMMARY Final Report
Aug. 1982 13 p
(PB83-113449) Avail: NTIS HC A02/MF A01; also available in set of 3 reports HC E99 as PB83-113431 CSCL 05B

A roadmap and strategy for improving information resources in support of the natural resources and other assets management responsibilities is outlined. GRA

N83-23204# Interior Dept., Washington, D.C. Office of Information Resources Management.
IRM (INFORMATION RESOURCES MANAGEMENT) LONG RANGE PLAN FY 1983-1987. VOLUME 2: PLAN OVERVIEW AND ENVIRONMENT Final Report
Aug. 1982 126 p 3 Vol.
(PB83-113456) Avail: NTIS HC A07/MF A01; also available in set of 3 reports HC E99 as PB83-113431 CSCL 05B

The goals and objectives, the planning process, and the planning environment are described for improving the Department of the Interior's information resources in support of departmental responsibilities for managing natural resources and other national assets. GRA

N83-23205# Interior Dept., Washington, D.C. Office of Information Resources Management.
IRM (INFORMATION RESOURCES MANAGEMENT) LONG RANGE PLAN FY 1983-1987. VOLUME 3: IRM PROJECTS AND FUNCTIONAL PLANS Final Report
Aug. 1982 316 p 3 Vol.
(PB83-113464) Avail: NTIS HC A14/MF A01; also available in set of 3 reports HC E99 as PB83-113431 CSCL 05B

The plan lays out the roadmap and strategy for improving the Department's information resources in support of the natural resources and other assets management responsibilities of the Interior Department. Bureau estimates of personnel and dollar resources to carry out the selected projects during each of the five years in the 1983-1987 planning period are presented. GRA

N83-23238# Council for Scientific and Industrial Research, Pretoria (South Africa). National Building Research Inst.
SELECTING A WORD PROCESSOR FOR THE TECHNICAL COMMUNICATION INDUSTRY
P. A. Billingham *In its* Mini-Seminar on Tech. Commun. and Technol. Transfer Apr. 1982 19 p (For primary document see N83-23236 12-85)
Avail: NTIS HC A05/MF A01

N83-23239# Council for Scientific and Industrial Research, Pretoria (South Africa). Technical Publications Services.
PREPARATION OF TECHNICAL DOCUMENTATION, IN-HOUSE OR CONTRACT?
C. R. Curwen *In its* Mini-Seminar on Tech. Commun. and Technol. Transfer Apr. 1982 8 p (For primary document see N83-23236 12-85)
Avail: NTIS HC A05/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N83-23206# Council for Scientific and Industrial Research, Pretoria (South Africa).
ANNUAL TRANSPORTATION CONVENTION. VOLUME 1. SESSION A: EDUCATION AND RESEARCH. SESSION C: INTERMODAL COORDINATION. SESSION D: PUBLIC PASSENGER TRANSPORT. SESSION E: FREIGHT TRANSPORT
1982 425 p refs In ENGLISH and AFRIKAANS Conv. held in Pretoria, 9-13 Aug. 1982 4 Vol.
(CSIR-S-313-Vol-1; ISBN-0-7988-2506-5) Avail: NTIS HC A16/MF A01

The bus industry in South Africa offers three types of training courses: (1) traffic courses; (2) technical courses; and (3) managerial and administrative courses, which also fall into the categories of registered and unregistered courses. Although training facilities are run throughout the country by various bus companies, the training is of a fragmentary nature. It is proposed that a transport school or college be established as a central training body which coordinates training activities and offers training at economic, management, engineering, technical and operating levels. E.A.K.

N83-23207# Department of Transport (England).
RESEARCH FOR LAND BASED TRANSPORT IN THE UNITED KINGDOM DEPARTMENT OF TRANSPORT

R. J. Bridle *In* CSIR Ann. Transportation Conv., Vol. 1 1982 29 p (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

The changes in transport research, needs and structure of the research and development required to counteract the effects are reviewed. It begins with the need for research and development, identification of who is expected to use the results and ways in which they will be implemented. The method for procurement and the machinery for determining the program of research and development are described. A scenario describing problems in the next 10 years is used for selection of high priority areas of research and development. Closer cooperation with industry and a strategy to expedite commercial exploitation of the results of research and development are emphasized. E.A.K.

N83-23208# California Univ., Berkeley. Inst. of Transportation Studies.
RESEARCH IN TRANSPORTATION ENGINEERING IN THE UNITED STATES
C. L. Monismith *In* CSIR Ann. Transportation Conv., Vol. 1 1982 12 p refs (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

Determinations for civil engineering research which are considered necessary in the United States are studied. Research needs were examined for societal needs such as shelter, food, air, water, conservation, transportation, energy and public safety. Critical transportation issues were identified as: transportation and energy relationships, transportation system performance and design, bridge design and construction, pavement management and rehabilitation, transport system maintenance, quality control and recycling of material, effective utilization of existing transportation systems, transportation safety, transportation financing, transportation of hazardous materials and the role of transportation during major emergencies. E.A.K.

N83-23209# Department of Transport, Pretoria (South Africa). Metropolitan Transport Planning.
MANAGEMENT OF TRANSPORTATION RESEARCH
T. C. Mackey, R. I. Jackson, and P. G. Fanner *In* CSIR Ann. Transportation Conv., Vol. 1 1982 14 p refs (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

The extent of Transportation Research expenditure world wide is evaluated against South Africa's less than R6,5M annual research investment. A more benefit/cost type commercial approach a new procedure for guiding and controlling research using the practising engineer and expertise from outside are recommended. The need for timely evaluation is stressed and guidelines for this evaluation are provided. The need for a coordinating body for purely Transportation Research is emphasized. E.A.K.

N83-23210# Supreme Court of South Africa, Pretoria. Commission of Inquiry into Civil Aviation in South Africa.
CO-ORDINATION IN AVIATION IN SOUTHERN AFRICA c03
C. S. Margo *In* CSIR Ann. Transportation Conv., Vol. 1 1982 13 p (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

The principles and economics of transport in the context of an adequate and efficient network of air services in Southern Africa are discussed. Probable future developments in the demand for transport are examined. The advantages of air transport and the use thereof in Southern Africa are analyzed. The economics of air transport in the region are examined and solutions are offered for the effective coordination of a suitable transport network, and for the provision and maintenance of the necessary infrastructure. E.A.K.

N83-23211# South African Transport Services, Johannesburg.
THE ROLE OF RAIL TRANSPORT IN THE TOTAL TRANSPORT SCENE. FREIGHT TRANSPORT
G. D. vanderVeer *In* CSIR Ann. Transportation Conv., Vol. 1 1982 27 p (For primary document see N83-23206 12-85)
Avail: NTIS HC A16/MF A01

The extent and nature of rail transport in South Africa is described. As far as land transport is concerned, the proportional market share of rail transport has decreased over the past two decades, although the actual freight tonnages transported have increased substantially. The nature of this share of the market has changed as bulk goods and passenger commuter traffic now comprise an increased portion of the total share, whereas the proportion of high rated traffic has decreased. Rail transport in South Africa plays an economic, strategic, socio-economic and international role, of which the first is the dominating aspect. Under certain circumstances rail transport is the most economical mode of transport mainly due to its lower energy requirements. In an effort to regain for rail transport what is considered its optimum market share, steps were taken and are under way to increase the efficiency of the actual rail transport operations and to meet future demands for this mode. E.A.K.

N83-23212# Council for Scientific and Industrial Research, Pretoria (South Africa).
ANNUAL TRANSPORTATION CONVENTION, VOLUME 2. SESSION F: ENERGY AND TRANSPORTATION ENGINEERING. SESSION G: TRANSPORT PLANNING
1982 463 p refs In ENGLISH and AFRIKAANS Conv. held in Pretoria, 9-13 Aug. 1982 4 Vol.
(CSIR-S-313-Vol-2; ISBN-0-7988-2507-3) Avail: NTIS HC A20/MF A01

Issues regarding gasoline shortages, alternative fuels, and electric motor vehicles are discussed. Urban development and transportation planning methods are also a considered. For individual titles, see N83-23213 through N83-23220.

N83-23213# Van Wyk and Louw, Inc., Pretoria (South Africa).
GASOLINE SHORTFALL MANAGEMENT c81
Victor Prins *In* CSIR Ann. Transportation Conv., Vol. 2 1982 23 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

Two aspects of a gasoline shortfall are emphasized: the options available to the government to deal with it and the requirements for a quantitative methodology to evaluate these options. To answer these questions the the US experience of shortfalls is sketeched a conceptual framework from within which to view a shortfall is developed, and a methodology to evaluate different policy alternatives from an efficiency as well as an equity perspective is outlined. S.L.

N83-23214# Council for Scientific and Industrial Research, Pretoria (South Africa).
ALTERNATIVE MOTOR FUELS c28
Ernst A. Uken (FEDHASA) *In its* Ann. Transportation Conv., Vol. 2 1982 27 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

South Africa has many options as far as alternative motor fuels are concerned. These range from the existing SASOL synfuel from coal program, which will eventually satisfy 60 per cent of the transport needs, to methanol, ethanol and esterified plant oils. The use of these alternatives in spark ignition and compression engines is considered, either as supplements or as total substitutes for oil products. S.L.

N83-23215# Daimler-Benz A. G., Stuttgart (West Germany).
PROSPECTS OF MOTOR VEHICLES AS A MEANS OF TRANSPORTATION AND OF ALTERNATIVE DRIVES
C. F. Bader *In* CSIR Ann. Transportation Conv., Vol. 2 1982 23 p (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

The predominance of motor vehicles as a means of transport is ascribable to the various advantages that such vehicles offer, including their use of liquid fuels, which makes them very versatile. It is necessary to investigate to what extent crude oil can be replaced with alternative fuels or drives as the means of supplying energy to motor vehicles. Alternative drives may consist of an electric energy supply on its own, or may combine two different driving or energy-supplying units in the form of a hybrid drive

system. The various possible alternative drives for buses should meet the critica of freedom of operational choice, independent of crude oil and use of primary energy to varying extents. Except in the case of the trolley bus, freedom of operational choice and increased independence of crude oil are always accompanied by increased use of primary energy, and usually by higher operating costs. The higher costs are partly a result of higher vehicle purchasing costs and partly a result of the additional infrastructure required for operation. Author

N83-23216# Siemens A.G., Erlangen (West Germany). Traction Systems and Vehicles.

NEW ELECTRIC TRACTION UNITS OF GERMAN DESIGN FOR CITY TRANSPORT AND SUBURBAN TRAINS

G. Scholtis *In* CSIR Ann. Transportation Conv., Vol. 2 1982 32 p (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

Four forms of city and suburban transportation are discussed namely multiple unit suburban trains, metros, light rail systems and tramways. Under each of these transportation forms the various users of the particular system both within West Germany and in other countries are listed. Data on the vehicle sizes and capacities in the various countries is presented. Some operating parameters of the various vehicles, such as speeds, acceleration and braking, are discussed. Technical solutions and developments as well as maintenance aspects, and comfort of the commuter are presented. The energy saved due to the use of modern electric technology is given some attention as well, and developments are highlighted. It is concluded that the various systems were developed over many decades, but that progress is being made in all the systems towards achieving more economical and efficient services. S.L.

N83-23217# Department of Transport, Pretoria (South Africa).

COMMUNITY SIZE, CITY SIZE AND CBD ACCESSIBILITY

T. C. Mackey *In* CSIR Ann. Transportation Conv., Vol. 2 1982 22 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

The interrelationship between land use and transportation is now readily accepted. However, it is contended that more attention should be paid to optimizing the size of urban communities. The general factors influencing urban growth are identified, and each of these factors is analyzed in terms of how they affect optimum size, under the headings of philosophy, sociology, water supply, sewage, cleansing and fire services, roads and transportation, power supply, administration, macroeconomics and control. It is suggested that optimum populations for metropolitan areas may be approximately 2,000,000, and for cities between 200,000 and 300,000. In dealing with the accessibility of central business districts, the road networks serving the CBDs are identified the bulk factors provided and attained, the modal splits in practice and what the effects of change would be, and some thoughts on the implications of rapid rail transit given. S.L.

N83-23218# Council for Scientific and Industrial Research, Pretoria (South Africa). Transport Planning and Transport Operations Groups.

URBAN DEVELOPMENT PLANNING

P. R. Mann and Antony V. Trowbridge *In its* Ann. Transportation Conv., Vol. 2 1982 19 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

Conceptions of development are constantly changing and reliance upon a world model is inappropriate, especially with rapidly increasing population and urban migration. Urban migration is seen as a threat to orderly development and the ways in which the authorities typically respond to it are shown to be inadequate. The national development policy is divided into three components, and the need for policies for these components, as well as policies to control the way in which they are linked to one another is shown. Urban development is the principal component and objectives for urban development planning are therefore proposed. S.L.

N83-23219# Council for Scientific and Industrial Research, Pretoria (South Africa). Transport Planning and Transport Operations Groups.

TRANSPORT AND URBAN DEVELOPMENT

P. R. Mann *In its* Ann. Transportation Conv., Vol. 2 1982 14 p ref (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

Transport planning has received considerable attention in South Africa over the last decade. The use of formalized transport planning procedures has increased rapidly, while in the developed countries for which these procedures were initially developed, much disenchantment is voiced. Because of the marked differences which emerged from a comparison of the characteristics of less developed countries with those of developed countries, there are numerous misgivings concerning the application of formalized approaches in South Africa. It is suggested that many of the difficulties are due to the nature of training in transport planning, the current perceptions of those professions most intimately involved in transport, and the scant attention paid to understanding and describing fully the problems and issues which face South Africa. It is proposed that transport objectives should be linked with urban development objectives. S.L.

N83-23220# Witwatersrand Univ., Johannesburg (South Africa).

ISSUES FACING TRANSPORT PLANNERS IN SOUTH AFRICA

R. J. Brown and R. A. Stanway (Stanway Edwards Associates) *In* CSIR Ann. Transportation Conv., Vol. 2 1982 36 p refs (For primary document see N83-23212 12-85)
Avail: NTIS HC A20/MF A01

Issues facing transport planners in South Africa within the context of planning in a developing country are discussed. The planning process is examined in terms of organization, the relationship between long term and short term planning, scenarios, monitoring and review and the development of transport policies. The methodology is examined in terms of alternative techniques such as sketch planning and activity travel systems; techniques such as origin destination matrices from traffic counts and individual choice models; and finally in terms of refinements to techniques such as trip generation, car ownership, partial matrix techniques and junction assignments. Computer applications are discussed and it is concluded that many of the process and methodology items examined are applicable to developing countries like South Africa. S.L.

N83-23221# Council for Scientific and Industrial Research, Pretoria (South Africa).

ANNUAL TRANSPORTATION CONVENTION. VOLUME 3. SESSION H: TRANSPORT INFRASTRUCTURE

1982 367 p refs In ENGLISH and AFRIKAANS Conv. held in Pretoria, 9-13 Aug. 1982 4 Vol.
(CSIR-S-313-Vol-3; ISBN-0-7988-2508-1) Avail: NTIS HC A16/MF A01

Recycling of asphalt pavement, hot mix recycling, reclaiming asphalt pavement material, recycling additives, low cost road design and construction, and road cut slope design and construction are addressed. Author

N83-23222# Texas A&M Univ., College Station. Texas Transportation Inst.

RECYCLING OF ASPHALT PAVEMENT

J. A. Epps *In* CSIR Ann. Transportation Conv., Vol. 3 1982 34 p refs (For primary document see N83-23221 12-85)
Avail: NTIS HC A16/MF A01

Types of pavement recycling operation are defined and guidance on selecting the most appropriate recycling operation for a particular pavement section is given. Operations for surface recycling and cold asphalt pavement recycling were emphasized. Mixture design procedures and structural design considerations are described, and an extensive reference list is provided. Author

N83-23223# Council for Scientific and Industrial Research, Pretoria (South Africa). National Inst. for Transport and Road Research.

HOT MIX RECYCLING

Vladis P. Servas *In its* Ann. Transportation Conv., Vol. 3 1982 31 p refs (For primary document see N83-23221 12-85)
Avail: NTIS HC A16/MF A01

The merits and current shortcomings of central-plant hot mix recycling, the options of pavement material removal for reuse together with questions of haulage economics and storage of the reclaimed material are considered. Design and quality control aspects are examined and a new approach and contractual procedures are recommended. Author

N83-23224# Council for Scientific and Industrial Research, Pretoria (South Africa).
RECLAIMING ASPHALT PAVEMENT MATERIAL
M. R. Hughes (Wirtgen Road Reconstruction Equipment Ltd.) and J. G. M. Burger (Peggs Engineering) *In its* Ann. Transportation Conv., Vol. 3 1982 18 p refs (For primary document see N83-23221 12-85)
Avail: NTIS HC A16/MF A01

Two basic methods are used to remove the asphalt for re-use: ripping, breaking and subsequent crushing, and controlled removal and crushing of material by a milling machine. Many asphalt maintenance problems can be solved by controlled machine-removal of asphalt. This salvaged asphalt can be stockpiled for re-use or recycling by an off-site recycling plant. The use of this method in the Van Reenen's Pass contract is discussed. Author

N83-23225# Council for Scientific and Industrial Research, Pretoria (South Africa). National Inst. for Transport and Road Research.
HEAVY VEHICLE SIMULATOR TESTING OF SOME SEGMENTAL CONCRETE BLOCK PAVEMENTS
J. M. Clifford and P. F. Savage (Pretoria Univ.) *In its* Ann. Transportation Conv., Vol. 3 1982 21 p refs (For primary document see N83-23221 12-85)
Avail: NTIS HC A16/MF A01

A large number of segmental block pavement experimental sections were constructed and tested with a Heavy Vehicle Simulator(HVS). The tests allowed rapid evaluation of a variety of subgrade, subbase and loading conditions. The tests are described and the results are discussed. Tests performed with the HVS support design proposals for heavy industrial pavements and for urban roads. An economical design method using various equivalency factors is suggested. Author

N83-23226# Texas A&M Univ., College Station. Texas Transportation Inst.
DETERMINING PROPERTIES IN PAVEMENT REHABILITATION, THE TEXAS APPROACH
R. L. Lytton and J. A. Epps *In* CSIR Ann. Transportation Conv., Vol. 3 1982 38 p refs (For primary document see N83-23221 12-85)
Avail: NTIS HC A16/MF A01

A Rehabilitation and Maintenance System which contains a set of mathematical models that can be used by management as planning tools for deciding on cost-effective maintenance and rehabilitation measures for Texas highways was developed. The primary purpose of these models is to (a) identify and schedule cost-effective rehabilitation and maintenance strategies, (b) quantify the benefits of rehabilitation and maintenance strategies, (c) draw up a rehabilitation and maintenance plan, taking into account constraints on the system where necessary, and (d) determine the most effective rehabilitation and maintenance policies. Author

N83-23227# Council for Scientific and Industrial Research, Pretoria (South Africa).
ANNUAL TRANSPORTATION CONVENTION. VOLUME 4. SESSION I: TRAFFIC ENGINEERING. SESSION J: TRANSPORT SAFETY. SESSION K: TRANSPORT ECONOMICS
1982 471 p refs In ENGLISH and AFRIKAANS Conv. held in Pretoria, 9-13 Aug. 1982 4 Vol.
(CSIR-S-313-Vol-4; ISBN-0-7988-2509-X) Avail: NTIS HC A20/MF A01

Several areas of transportation are addressed including traffic engineering, transport safety, and transport economics. For individual titles, see N83-23228 through N83-23235.

N83-23228# Bergman (B. S.) and Partners, Inc., Johannesburg (South Africa).
FREEWAY TRAFFIC LANE CAPACITY
D. G. Skinner and W. E. W. Hahn (Hawkins, Hawkins and Osborn) *In* CSIR Ann. Transportation Conv., Vol. 4 1982 18 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

The manual methods used to measure the capacity of urban freeway traffic lanes are described. Extremely high five minute rates of flow, greater than 2,600 vehicles per hour (vph), were observed on the median (fast) lane. Such high values appear to be peculiar to South Africa is 1,525 vph. A design value of 2,000 vph is proposed as being more appropriate to South African conditions. An investigation of freeway capacity throughout South Africa, including the effect of trucks on capacity, is suggested prior to acceptance of the revised proposals contained in the new Highway Capacity Manual. Author

N83-23229# Hawkins, Hawkins and Osborne, Cape Town (South Africa).
RECENT DEVELOPMENT IN HIGHWAY CAPACITY
J. R. Jones *In* CSIR Ann. Transportation Conv., Vol. 4 1982 34 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

The historical background to the publication of the 1965 Highway Capacity Manual is presented briefly. Certain deficiencies and outdated aspects of the Manual have necessitated a major revision of its content, and the development of an improved manual is reviewed. Some of the most important recommendations are that the level of service concept should be extended and that measures of judging the effectiveness of service should be derived, such as vehicle delay and safety. Simplicity and consistency should be the keynote of the proposed methods. In critical movement analysis delay is used as the measure of effectiveness, and in the evaluation of unsignalized intersections and pedestrian facilities reserve capacity is used as a measure of effectiveness. The new manual will contain values that are meaningfully different from those used previously. Author

N83-23230# Transport and Road Research Lab., Crowthorne (England).
ON-LINE OPTIMISATION OF SIGNAL COORDINATION, THE SCOOT METHOD
D. I. Robertson, P. B. Hunt, R. D. Bretherton, and G. T. Bowen *In* CSIR Ann. Transportation Conv., Vol. 4 1982 12 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

Traffic signals in urban areas are often coordinated together on 'fixed time' plans that are preset to suit average condition . SCOOT (Split, Cycle and Offset Optimization Technique) is a ne v method of coordination that adjusts the signal timings in freque t, small increments to match the latest traffic situation. Data from vehicle detectors are analyzed by an online computer which contains programs that calculate and implement those timings that are predicted to minimize congestion. SCOOT is designed for general application within computerized Urban Traffic Control systems. As part of this work, SCOOT systems have been implemented in Glasgow and Coventry and traffic surveys have been conducted on a total of 62 signals. It is concluded that SCOOT reduces vehicle delay by an average of about 12 per cent compared with up to date optimized fixed time plans; further substantial benefits are likely where the fixed time plans are based on old traffic data. Author

N83-23231# Technion - Israel Inst. of Tech., Haifa. Transportation Research Inst.
A METHODOLOGY TO EVALUATE ENGINEERING IMPROVEMENTS AT HAZARDOUS LOCATIONS, A CASE STUDY
A. S. Hakkert and M. Livneh *In* CSIR Ann. Transportation Conv., Vol. 4 1982 17 p refs (For primary document see N83-23227 12-85)

Avail: NTIS HC A20/MF A01

A detailed methodological analysis of the accident situation at one complicated site, which over a period of five years attracted 67 injury accidents was presented. The site is a one kilometer section on a dual carriageway which includes a downgrade, a sharp curve and two intersections on both sides of the curve. The principal factors associated with the accidents at the site were a high travel speed on the downhill approach, a visual misintepretation of the sharp horizontal curve, and a low coefficient of friction causing many skidding accidents. After a detailed engineering analysis of the site, various solutions were evaluated. The engineering improvements finally selected included curve redesign, pavement resurfacing, provision of shoulders on the curve and street lighting at the intersections, and redesign of the intersections. This solution was assessed in terms of costs and estimated benefits. After implementation of the improvements, the site was monitored for a further five year period. Author

N83-23232# National Inst. for Transport and Road Research, Pretoria (South Africa).

IMPROVING THE SAFETY OF ROADS IN RESIDENTIAL AREAS

Romano F. DelMistro *In* CSIR Ann. Transportation Conv., Vol. 4 1982 25 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

The road accident patterns of four Pretoria suburbs (Villieria, Danville, Lynnwood Glen and Wingate Park) are discussed. These four suburbs were selected for analysis because of the fundamental differences between road networks. The analysis showed that the different road networks resulted in different accident patterns. Three problem areas were identified, which were: through traffic, traffic speed, and specific hazardous locations, situations and problems. Remedies for these problems are proposed and it is recommended that the concept of maximum design speed be used in designing future residential road networks. Author

N83-23233# South African Airways, Johannesburg.

CHARACTERISTICS REQUIRED FOR PILOT SELECTION IN SOUTH AFRICAN AIRWAYS c53

P. H. J. Pienaar *In* CSIR Ann. Transportation Conv., Vol. 4 1982 15 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

Over the last few years aircraft have achieved an amazing degree of reliability and safety. The human factor is usually regarded as the weak link in the chain. Analyses performed by the International Air Transport Association indicate that 70 percent of the take off climb and descent approach and accidents involve human error. The objective of the pilot selection process is to find individuals who have captain potential, are of above average intelligence, are technically skilled, and possess leadership qualities. In addition, certain personality traits in candidate pilots are evaluated. These include their reasons for wishing to become pilots, and any over or under reaction to certain factors which produce tension, stress, conflict and could possibly interfere with flight proficiency and safety. Author

N83-23234# Department of Transport, Pretoria (South Africa).

HUMAN FACTORS IN AIR SAFETY c03

J. J. S. Germishuys *In* CSIR Ann. Transportation Conv., Vol. 4 1982 8 p refs (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

The human factor in aviation safety, and the relationship between aircraft accidents and man's involvement were discussed. The emphasis is on educating pilots in a process of self analysis, whereby they recognize their limitations and take positive steps to ensure that such limitations do not impede air safety. Safety in general could be improved in this way. Author

N83-23235# National Inst. for Transport and Road Research, Pretoria (South Africa).

THE PERFORMANCE OF COMMERCIAL VEHICLE TIRES UNDER BRAKING CONDITIONS c37

J. C. Hillman *In* CSIR Ann. Transportation Conv., Vol. 4 1982 16 p (For primary document see N83-23227 12-85)
Avail: NTIS HC A20/MF A01

The incidence of front into rear impact accidents involving heavy commercial and articulated vehicles with other road users could possibly be attributed to a lower standard of braking performance amongst this class of vehicle. One of the key factors during braking is the ability of the tires to transmit the maximum force to the road surface without locking up. The ever present truck tire skid marks found at intersections and the bias of truck tire advertising towards high mileage and cut resistance, rather than towards road grip, prompted the Vehicle Safety Group of the National Institute for Transport and Road Research to design an experiment to evaluate the braking performance of locally available makes of the most popular 11,00 x 20 14 PR truck. Author

N83-23236# Council for Scientific and Industrial Research, Pretoria (South Africa). Production Engineering Advisory Service.

MINI-SEMINAR ON TECHNICAL COMMUNICATION AND TECHNOLOGY TRANSFER

Apr. 1982 85 p Seminar held in Pretoria, Apr. 1982
(CSIR-TSD-0002/82; ISBN-0-7988-2358-5) Avail: NTIS HC A05/MF A01

Technical writing, the selection of word processors for commerce and industry, and steps in the technology transfer process are considered from a management point of view. For individual titles, see N83-23237 through N83-23239.

N83-23237# Council for Scientific and Industrial Research, Pretoria (South Africa).

TECHNOLOGY TRANSFER, THE STIMULUS FOR PROGRESS

T. Hodgson *In its* Mini-Seminar on Tech. Commun. and Technol. Transfer Apr. 1982 17 p refs (For primary document see N83-23236 12-85)
Avail: NTIS HC A05/MF A01

The need for technology transfer to the metal working industry in South Africa is examined. The benefits to be accrued by companies involved in machining high silicon aluminum castings, tungsten carbide dies, and cast iron cooker plates or in form milling ROQ-TUF AD alloy steel, roll thread tapping, and in the cryogenic treatment of drawing dies are listed. The sequence of events in the transfer process, problems in technology transfer, and the organizations concerned with technology transfer in South Africa are discussed. Tables show the rate of annual change for gross domestic product per economically active persons from 1972 through 1979 for the eleven most productive countries. Special emphasis is given to progress in Israel, Taiwan, and South Africa. A.R.H.

N83-23238# Council for Scientific and Industrial Research, Pretoria (South Africa). National Building Research Inst.

SELECTING A WORD PROCESSOR FOR THE TECHNICAL COMMUNICATION INDUSTRY c82

P. A. Billingham *In its* Mini-Seminar on Tech. Commun. and Technol. Transfer Apr. 1982 19 p (For primary document see N83-23236 12-85)
Avail: NTIS HC A05/MF A01

Some of the less obvious ways in which word processing can benefit a company are indicated and a rational approach to selecting suitable word processing equipment is described. Topics covered include input, output, and processing options; document housekeeping; programmability; training; shared-logic versus stand-alone; information systems; and the local area network. A.R.H.

N83-23239# Council for Scientific and Industrial Research, Pretoria (South Africa). Technical Publications Services.

PREPARATION OF TECHNICAL DOCUMENTATION, IN-HOUSE OR CONTRACT? c82

C. R. Curwen *In its* Mini-Seminar on Tech. Commun. and Technol. Transfer Apr. 1982 8 p (For primary document see N83-23236 12-85)
Avail: NTIS HC A05/MF A01

In most instances, it is more cost effective to provide an in-house facility for the writing of all types of technical documentation. For most companies, the illustrating, graphic designing, and editing functions are more cost effective when handled by contractors. Reproduction facilities may be provided in-house, or use may be made of contractors, depending on the amount of work to be reproduced. The actual cost of reproduction is not affected to any great extent by the decision. Other factors that must be considered before a decision can be reached are security, control, convenience, access to information, personnel requirements, and training. A.R.H.

N83-23240*# Systems Control, Inc., West Palm Beach, Fla.
HELICOPTER TECHNOLOGY BENEFITS AND NEEDS. VOLUME 1: SUMMARY
John Zuk (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.) and Richard J. Adams Jul. 1980 34 p refs Presented at Public Service Helicopter Users' Workshop, Moffett Field, Calif., 14-16 Jul. 1980 2 Vol.
(Contract NAS2-10411)
(NASA-CR-166469-Vol-1; NAS 1.26:166469-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 05A

Present public service helicopter benefits and the potential benefits of an advanced public service rotorcraft (200 knots to 300 knots) are summarized. Past and future public service growth is quantified and assessed and needs, problem areas, and desired vehicle characteristics are defined. Research and technology recommendations are formulated and the costs and benefits of research options are assessed. A.R.H.

N83-23241*# Systems Control, Inc., West Palm Beach, Fla.
HELICOPTER TECHNOLOGY BENEFITS AND NEEDS. VOLUME 2: APPENDICES
John Zuk (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.) and Richard J. Adams Jul. 1980 53 p refs Presented at Public Service Helicopter Users' Workshop, Moffett Field, Calif., 14-16 Jul. 1980 2 Vol.
(Contract NAS2-10411)
(NASA-CR-166470-Vol-2; NAS 1.26:166470-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 05A

Vehicle design, avionics and flight systems; safety and reliability; navigation, guidance and flight control; propulsion; auxiliary systems; human factors; and monitoring and diagnostic systems are the technology areas involved in solving operational and technical problems related to the use of helicopters. Tables show the problems encountered and the proposed research and technology for helicopter use for search and rescue; emergency medical services; law enforcement; environmental control; fire fighting; and resource management. A.R.H.

N83-23242# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PREFERENTIAL FLOW DIRECTIONS: A GEOMETRICAL METHOD FOR PRELIMINARY ANALYSIS [DIRECOES PREFERENCIAIS DE FLUXO - UM METODO GEOMETRICO PARA ANALISE PRELIMINAR DE DESE.'O]
Augusto Magno Caldeira deAbreu, Emanuel Fernandes, and Flavio Freitas Faria Mar. 1983 21 p refs In PORTUGUESE Presented at the Simposio Sobre Modelos Urbanos, Regionais e de Transportes, Sao Paulo, Mar. 1983
(INPE-2688-PRE/287) Avail: NTIS HC A02/MF A01

The problem of preferential flow directions is analyzed taking into consideration a city with a dense street grid, represented by a plan comprised of the desired lines and possible locations of a large transport axis through which all the flows pass. For each possible axis, two basic parameters are calculated: the average number of passengers and the ratio of the parts of the flows inside and outside the axis. Axes that represent convenient values are selected. N.W.

N83-23243# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research.
ROADWAY-POWERED ELECTRIC-VEHICLE PROJECT Final Report
Carl E. Walter and John D. Salisbury 30 Sep. 1982 54 p refs (Contract W-7405-eng-48)
(DE83-003147; UCID-19576) Avail: NTIS HC A04/MF A01

The roadway powered electric vehicle (RPEV) project was started in 1979 to conduct tests of the roadway and the vehicle and to investigate the impact on electric utility generating capacity of wide scale deployment of powered roadways. Information is presented on: the RPEV system analysis to identify the parameters of importance and to provide a framework for testing; the test facility which contains a 220-m long test track with a 50-m long powered section; the safety, driveability, compatibility, and power loss measurements; cost analysis and benefits of RPEV's and their impact on electric utilities for increased power demand. It is indicated that RPEV's are technically feasible, power pickup efficiencies as high as 96% were obtained, the system is safe, the transportation dependence on petroleum would be reduced by the use of RPEV's, the capital cost of the system is manageable, and the impact on electric utilities depends on the areas in which RPEV's are developed. DOE

N83-23244# AiResearch Mfg. Co., Torrance, Calif.
STUDY OF VACUUM SYSTEMS FOR A HEAT ENGINE/FLYWHEEL AUTOMOTIVE PROPULSION SYSTEM Final Report
M. D. Lieber 11 Jul. 1982 72 p refs Revised
(Contract W-7405-eng-48)
(DE83-002284; UCRL-15502-Rev-1) Avail: NTIS HC A04/MF A01

Vacuum systems for a heat engine/flywheel automotive propulsion system were investigated. A vacuum environment is required to keep rotational losses and subsequent overheating of the flywheel energy storage unit (ESU) to a minimum. The overall vacuum system includes the vacuum pumps, flywheel shaft seals, vacuum sensors, tubing and any other components expressly designed with the purpose of maintaining the vacuum level in the ESU. The vacuum pump is the main component of the overall vacuum system and as such, most of this report details with selection of a vacuum pump. Information for selecting a vacuum system design with the ultimate goal of incorporating the flywheel into a mass produced automotive vehicle is presented. DOE

N83-23245# Mellon Inst., Arlington, Va. Energy Productivity Center.
MAINTAINING AUTOMOTIVE MOBILITY: USING FUEL ECONOMY AND SYNTHETIC FUELS TO COMPETE WITH OPEC OIL Final Report
Richard H. Shackson and H. James Leach 1 Mar. 1982 101 p refs
(Contract DE-AC02-79CS-50108)
(DE83-004873; DOE/CS-50108/1) Avail: NTIS HC A06/MF A01

The improvement of fuel economy and the production of nonpetroleum fuels which are critions for implementation of cost reduction and reliability strategies over the next 20 years are compared. The study methodology has three major components: (1) an estimate of the costs of improving automobile and light truck fuel economy; (2) an estimate of the cost of producing synthetic fuels for transportation; and (3) subjecting these estimates to the scrutiny and criticism of a steering group composed of experts in the relevant fields. The methodology and data used to compute new automobile and light truck fuel economy, fleet fuel consumption, capital requirements, and consumer costs, under different scenario assumptions for the years 1980 to 2000 are described. The baseline technology fleet characteristics and the automotive technology are described. The effects of introducing new technologies into the car and truck fleet are examined based on several scenarios, followed by a sensitivity analysis. DOE

N83-23246# Clarkson Coll. of Technology, Potsdam, N.Y.
CONSUMER ACCEPTANCE OF ELECTRIC VEHICLES
Beheruz N. Sethna 2 Sep. 1982 88 p
(Contract DE-FG01-79CS-50045)
(DE82-021175; DOE/CS-50045/T1) Avail: NTIS

HC A05/MF A01

Guidances for the enhancement of consumers' perceptions to electric vehicles (EV) were determined. The specific objectives are to: expose the population of Potsam, New York to an electric car, and to demonstrate its functioning; determine the relative importance of the different attributes of the electric car from the viewpoint of the potential consumer; and determine changes in consumers' perceptions after exposure to the car (and accompanying media coverage), as compared with their perceptions before exposure. It is concluded that were: exposure to the EV and advertising positively affect its public acceptance; the high price is the most negative feature; energy tax credits would promote EV sales; and the most probable current use of EV's is in utility service fleets. DOE

N83-23247# Battelle Pacific Northwest Labs., Richland, Wash.
TECHNOLOGY-TRANSFER WORKSHOP
Aug. 1982 256 p refs Proceedings of Workshop held in Seattle, 17-18 Sep. 1981 Sponsored in part by EPRI
(Contract DE-AC06-76RL-01830)
(DE83-001224; EPRI-NP-2562; CONF-8109185) Avail: NTIS HC A12/MF A01

The technology transfer process was studied. Relevant theories, the importance of planning for the process, and presented possible organizational structures to help promote the process were addressed. It is concluded that: it is important to identify incentives; the process is more effective if it is personalized; planning cannot start too early; recipes can be developed for customizing to specific situations; and both transmitter and receptor must recognize and fulfill their roles. DOE

N83-23248# Science Applications, Inc., La Jolla, Calif.
APPLICATION OF NUMERICAL-SIMULATION METHODOLOGY TO AUTOMOTIVE COMBUSTION Technical Progress Report
Sep. 1982 92 p refs
(Contract DE-AC04-79ET-15397)
(DE83-003302; DOE/ET-15397/T5) Avail: NTIS HC A05/MF A01

A numerical simulation technique for in cylinder reactive flows in internal combustion engines was developed. Previous work on the project involved the continued development and validation of a finite difference based simulation model (MAGIC) for time dependent axisymmetric flows which includes: a generalized coordinate system for arbitrary mesh design and treatment of complex and time dependent boundaries; multiple and interacting chemical species; coupled swirl velocity component; and two equation turbulence closure. The program phase involved: the final development and validation of the fuel injection/droplet evolution model; the completion of a valve model which accounts for intake and exhaust flow processes; development of the heat transfer prediction capability with the initiation of engine heat transfer studies; continuation of numerical development studies related to swirling flow and reactive turbulence modeling; and the initiation of induction stroke simulation studies. Finally, the model was validated and exercised for parametric studies of fuel/air mixing resulting from liquid fuel injection and the study of hydrocarbon quench layer evolution under realistic engine conditions. DOE

N83-23249# Southwest Research Inst., San Antonio, Tex.
CHARACTERIZATION OF EXHAUST EMISSIONS FROM METHANOL- AND GASOLINE-FUELED AUTOMOBILES Final Report, Jun. 1981 - Mar. 1982
Lawrence R. Smith and Charles M. Urban Aug. 1982 180 p refs
(Contracts EPA-68-03-2884; EPA-68-03-3073)
(PB83-116830; EPA-460/3-82-004) Avail: NTIS HC A09/MF A01 CSCL 13F

Regulated and unregulated exhaust emissions from four light duty, ignited automobiles were characterized. Two of the automobiles were evaluated with gasoline; one of these was also operated on a gasoline alcohol blend. The two other vehicles were evaluated with methanol fuel. The automobiles were evaluated over the Light-Duty Federal Test Procedure (FTP) and the Highway Fuel Economy Driving Schedule (HFET). Addition evaluations with the methanol fueled automobiles were conducted using promoted base metal catalysts, and the one was evaluated in a noncatalyst configuration. GRA

N83-23250# General Research Corp., Santa Barbara, Calif.
SYNTHETIC FUELS FOR TRANSPORTATION. BACKGROUND PAPER 1: THE FUTURE POTENTIAL OF ELECTRIC AND HYBRID VEHICLES
W. M. Carriere, W. F. Hamilton, and L. M. Morecraft Mar. 1982 236 p refs Sponsored by Office of Technology Assessment
(PB83-126086; OTA-BP-E-13; LC-82-600500) Avail: NTIS HC A11/MF A01 CSCL 13F

A comprehensive review of the future of electric and hybrid vehicles through the year 2010 in the United State was presented. It discussed the technology, performance, and limitations of probable future electric and hybrid vehicles; the infrastructure necessary to produce and support them; market-ability; and and finally, effects on the nation if used in a large numbers. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N83-23251*# Hawaii Univ., Honolulu. Inst. for Astronomy.
ASTRONOMICAL STUDIES OF THE MAJOR PLANETS, NATURAL SATELLITES AND ASTEROIDS USING THE 2.24 m TELESCOPE Semiannual Progress Report, Jan. - Jun. 1982
John T. Jefferies 1982 35 p refs
(Grant NGL-12-001-057)
(NASA-CR-170190; NAS 1.26:170190; SAPR-24) Avail: NTIS HC A03/MF A01 CSCL 03A

Directional features in the Jovian sodium torus, high quality CCD images of the major planets, methane bands in the spectrum of Triton, the central wavelength of the SO2 absorption band on Io, a component on the icy surfaces of the satellites of Uranus, fluctuation of Io's volcanic radiation, standard stars, and thermal radiation from the four brightest satellites of Uranus are discussed. Author

N83-23252*# Hawaii Univ., Honolulu. Inst. for Astronomy.
ASTRONOMICAL STUDIES OF THE MAJOR PLANETS, NATURAL SATELLITES AND ASTEROIDS USING THE 2.24 m TELESCOPE Semiannual Progress Report, Jul. - Dec. 1982
John T. Jefferies 1982 57 p refs
(Grant NGL-12-001-057)
(NASA-CR-170191; NAS 1.26:170191; SAPR-25) Avail: NTIS HC A04/MF A01 CSCL 03A

Ground based detection of east-west asymmetries in the Jovian torus, three dimensional models of the plasma conditions in the Jovian torus, rotational variations in methane band images of Neptune, Io's rapid flickering, thermophysical models, the diameters and albedos of the satellites of Uranus from radiometric observations, the diameters of Pluto and Triton, standard stars are discussed. Author

N83-23253*# Texas Univ., Austin. Dept. of Astronomy.
ACCRETION INSTABILITY MODELS FOR DWARF NOVAE AND X-RAY TRANSIENTS
John K. Cannizzo, J. Craig Wheeler, and Pranab Ghosh (Tata Inst. of Fundamental Research, Bombay, India) [1982] 9 p refs

Submitted for publication Sponsored by NASA
(NASA-CR-170177; NAS 1.26:170177) Avail: NTIS HC A02/MF A01 CSCL 03A

Steady state and time dependent calculations of a model for accretion instability are presented, in which matter accumulates in a cold torus and then undergoes a thermal instability causing the matter to heat and flow down onto the central star. The model is compared to the observations of dwarf novae and certain examples of both hard and soft X-ray transients. Author

N83-23254*# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
EFFECTIVE TEMPERATURES AND LUMINOSITIES OF VERY HOT O-TYPE SUBDWARFS
D. Schoenberner and J. S. Drilling 1982 31 p refs
(Grants NAG5-71; NSF AST-80-18766; AF-AFOSR-0192-82)
(NASA-CR-170214; NAS 1.26:170214) Avail: NTIS HC A03/MF A01 CSCL 03A

Twelve very hot O-type subdwarfs were observed with the IUE-satellite in the low dispersion mode. Temperatures were derived from the slopes of the UV continua and distances were estimated from the color excesses. Most of them are hotter than 60,000 K, i.e., they are the hottest known subdwarfs. From their spectral appearance and location in a H.R.-diagram they form a rather inhomogeneous group. Three of them turned out to be central stars or nearly central stars, and four are definitely near the white dwarf stage. The surface helium to hydrogen ratio varies from about normal to the extreme case. Most of them appear to be post EHB objectives of 0.5 solar mass with a helium burning shell as their energy source, and their peculiar helium-to-hydrogen ratios are most likely the result of diffusion and convective mixing in surface layers. M.G.

N83-23255*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
OBSERVATIONS OF THE ULTRAVIOLET SPECTRA OF CARBON WHITE DWARFS Final Technical Report, 1 Nov. 1981 - 31 Oct. 1982
Gary A. Wagner 1982 43 p refs
(Grant NAG5-214)
(NASA-CR-170175; NAS 1.26:170175) Avail: NTIS HC A03/MF A01 CSCL 03A

Strong ultraviolet carbon lines were detected in additional white DC (continuous visual spectra) dwarfs using the IUE. These lines are not seen in the ultraviolet spectrum of the cool DC star Stein 2051 B. The bright DA white dwarf LB 3303 has a strong unidentified absorption near lambda 1400. S.L.

N83-23256# Los Alamos Scientific Lab., N. Mex. Theoretical Div.
THEORETICAL PULSATIONS OF THE BETA CEPHEI VARIABLE ALPHA VIRGINIS
Arthur N. Cox and Stephen W. Hodson 30 Jul. 1982 5 p refs Presented at the Conf. on Pulsation in Classical and Cataclysmic Variable Stars, Boulder, Colo., 1-5 Jun. 1982
(Contract W-7405-eng-36)
(DE82-021776; LA-UR-82-2348; CONF-8206101-5) Avail: NTIS HC A02/MF A01

A convective overshooting at the edge of the turbulently convective core of Beta Cephei variables which causes periodic mixing of hydrogen into the otherwise depleted core was suggested. The extra pressure at the mixing shell, due to the newly added hydrogen gives periodic pushes on the envelope and the pulsations grow. For the specific model, 2 Virginis is used, which has well-known mass, radius and luminosity. The recent stopping of the pulsations of this star indicates that the proposed overshooting growth of the convective core may be temporarily terminated. DOE

N83-23257# National Center for Atmospheric Research, Boulder, Colo. Atmospheric Technology Div.
THE HIGH ALTITUDE OBSERVATORY MULTI-USER FORTH SYSTEM LISTING
P. H. Seagraves Aug. 1982 87 p
(Grant NSF ATM-77-23757)
(PB83-134411; NCAR/TN-197) Avail: NTIS HC A05/MF A01 CSCL 03B

The listing for the Prominence Monitor (P-MON) version of the FORTH system, the version used to control the P-MON telescope at the Mauna Loa Solar Observatory (MLDO) on the island of Hawaii is presented. One of the most important technical developments that took place during the early phases of the high altitude observatory's cornal dynamics project is the accomplishment of the multiuser FORTH System. This is the same version that was supplied to the HAO Rocket CCD (charge-coupled device) group. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N83-23258# Los Alamos Scientific Lab., N. Mex. Computational Physics Group.
NEUTRON STAR COOLING: EFFECTS OF ENVELOPE PHYSICS
Kenneth A. VanRiper 1982 5 p refs Presented at the Intern. Astron. Union Symp. on Supernova Remnants and Their X-ray Emission, Venice, 29 Aug. - 2 Sep. 1982
(Contract W-7405-eng-36)
(DE83-001941; LA-UR-82-2844; CONF-820844-2) Avail: NTIS HC A02/MF A01

Neutron star cooling calculations are reported which employ improved physics in the calculation of the temperature drop through the atmosphere. The atmosphere microphysics is discussed briefly. The predicted neutron star surface temperatures, in the interesting interval 200 less than or equal to t (yr) less than or equal to 10 to 5th power, do not differ appreciably from the earlier results of Van Riper and Lamb (1981) for a non-magnetic star; for a magnetic star, the surface temperature is lower than in the previous work. Comparison with observational limits show that an exotic cooling mechanism, such as neutrino emission from a pion condensate or in the presence of percolating quarks, is not required unless the existence of a neutron star in the Tycho or SN1006 SNRs is established. Author

N83-23259# Los Alamos Scientific Lab., N. Mex.
VERY HIGH RESOLUTION CALCULATIONS OF VERY YOUNG SUPERNOVA REMNANTS
Eric M. Jones and Barham W. Smith 1982 5 p refs Presented at the Intern. Astron. Union Symp. on Supernova Remnants and Their X-ray Emission, Venice, 29 Aug. - 2 Sep. 1982
(Contract W-7405-eng-36)
(DE83-002080; LA-UR-82-2989; CONF-820884-1) Avail: NTIS HC A02/MF A01

The supernovae remnants (SNR) structure is described by blast wave theory.Both numerical calculations of the early phases and small scale, laboratory simulations show transition to blast wave at 8 to 10 masses. It is known that the transition region between the photosphere and the circumstellar medium plays a crucial role. The shock wave is strongly accelerated down the density gradient, which puts the shocked material behind into free expansion. When the shock encounters circumstellar material, it begins to decelerate and a second, reverse shock propagates into the stellar material that plows into the shocked circumstellar gas. The first attempts to describe the outer stellar envelop were aimed at analysis of the UV and X-ray bursts produced when the shock wave reaches the photosphere. The double shock structure is described, but lacked sufficient resolution to produce the detailed structure between the shocks. Very high resolution calculations which reproduce and confirm the Chevalier similarity solution are described. GRA

N83-23260# New Mexico Univ., Albuquerque.
RADIAL PULSATION PROPERTIES OF NEUTRON STAR MODELS
D. S. King, A. N. Cox (Los Alamos National Lab.), and S. W. Hodson (Los Alamos National Lab.) 1982 5 p refs Presented at the Conf. on Pulsations in Classical Cataclysmic Variable Stars, Boulder, Colo., 1-5 Jun. 1982
(Contract W-7405-eng-36)
(DE82-021775; LA-UR-82-2347; CONF-8206101-8) Avail: NTIS HC A02/MF A01

Preliminary results of a study of the linear, nonadiabatic, radial-pulsation properties of neutron-star models are presented. Sequences of pure ion models with masses of 1.0 M/sub solar/ and 1.8 M/sub solar/ and a range of luminosities and effective temperatures are considered. Magnetic fields are ignored. The densities of the envelopes at their lower boundary range up to rho approx. 10 to the 12th power g/sq cm. Equation of state and opacity tables are modifications of those provided by the Los Alamos opacity library (Huebner, et al., 1977). The motivation for this study was to determine whether or not variations of the iron opacity in the outer layers might produce pulsational instability. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N83-23261*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LARGE AMPLITUDE MHD WAVES UPSTREAM OF THE JOVIAN BOW SHOCK
Melvyn L. Goldstein, Charles W. Smith (New Hampshire Univ.), and William H. Matthaeus (Maryland Univ., College Park) Mar. 1983 38 p refs Submitted for publication
(NASA-TM-85005; NAS 1.15:85005) Avail: NTIS HC A03/MF A01 CSCL 03B

Observations of large amplitude magnetohydrodynamics (MHD) waves upstream of Jupiter's bow shock are analyzed. The waves are found to be right circularly polarized in the solar wind frame which suggests that they are propagating in the fast magnetosonic mode. A complete spectral and minimum variance eigenvalue analysis of the data was performed. The power spectrum of the magnetic fluctuations contains several peaks. The fluctuations at 2.3 mHz have a direction of minimum variance along the direction of the average magnetic field. The direction of minimum variance of these fluctuations lies at approximately 40 deg. to the magnetic field and is parallel to the radial direction. We argue that these fluctuations are waves excited by protons reflected off the Jovian bow shock. The inferred speed of the reflected protons is about two times the solar wind speed in the plasma rest frame. A linear instability analysis is presented which suggests an explanation for many of the observed features of the observations. Author

N83-23262*# SRI International Corp., Menlo Park, Calif. Molecular Physics Lab.
THEORETICAL STUDIES OF PHOTODISSOCIATION OF SMALL MOLECULES OF ASTROPHYSICAL IMPORTANCE Final Report
Roberta P. Saxon 22 Mar. 1983 13 p refs
(Contract NASw-3373)
(NASA-CR-170215; NAS 1.26:170215) Avail: NTIS HC A02/MF A01 CSCL 03B

The radicals and ions observed in comets result from photodissociation and photoionization of molecules. According to current models, a comet is composed chiefly of a large, solid nucelus of frozen gases (parent molecules) such as H2O, HCN, and NH3. It is believed comets were formed at the same time and in the same region of space as the major planets and that their chemical composition is the same as that of the early solar system. As the comet nears the Sun, the surface heats up, liberating the frozen gases as well as dust particles. Solar radiation photodissociates the parent molecules into fragments that are observed by resonance fluorescence. Both polyatomic molecules, present in the interstellar medium, and cometary radicals were observed. Using laboratory photo-dissociation data and computer models, astronomers are attempting to identify the parent molecules that account for all observed radicals and ions. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N83-23263# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
A SUMMARY OF SOLAR 1-8A MEASUREMENTS FROM THE SMS AND GOES SATELLITES, 1977-1981
S. D. Bouwer, J. Donnelly, J. Falcon, A. Quintana, and G. Caldwel Jul. 1982 75 p refs
(PB83-118174; NOAA-TM-ERL-SEL-62; NOAA-82083101) Avail: NTIS HC A04/MF A01 CSCL 03B

The 1-8A band of synodic full-disc solar X-rays (1-8A) W/m(2) were measured nearly continuously from 1975 to 1981 aboard the SMS-1, SMS-2, GOES-1, GOES-2, and GOES-3 satellites. The 1-8A band of X-rays are proportional to the emission measure at coronal heights at temperatures greater than 2,000,000 K. A practical method of describing solar 1-8A mean and background X-ray measurements in a continuous time series to describe long-term solar variability is discussed. Intercomparisons of the satellites using linear regression techniques and a useful background coronal index are described. Sources of error and statistical information on relative accuracy are discussed. Data are presented in monthly plots of hourly averages, in tables of daily mean and background indices, and in comparison to the Ottawa 10.7 cm radio flux. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N83-23264# Natal Univ., Durban (South Africa).
SELF-CONSISTENT SHOCK STRUCTURE IN THE PRESENCE OF COSMIC RAYS AND ALFVEN WAVES
J. F. McKenzie and H. J. Voelk 1981 4 p refs Transl. into ENGLISH from proceedings of the 17th Intern. Cosmic Ray Conf., 1981 Conf. held in Paris, 1981 Prepared in cooperation with Max-Planck-Inst. fuer Kernphysik, Heidelberg, West Germany
(OG-4-27) Avail: NTIS HC A02/MF A01

The structure of a parallel shock including the back reaction from cosmic rays and Alfven waves generated by the streaming instability were investigated. An integral of the wave growth equation which describes how the wave magnetic pressure is amplified by both adiabatic and instability effects is obtained. The results imply that the overall efficiency of the conversion of flow energy to cosmic ray energy may only become high provided that the wave power is saturated at some modest level by nonlinear effects. S.L.

N83-23265*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RAPID X-RAY VARIABILITY FROM THE SEYFERT 1 GALAXY NGC 4051

F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker (Virginia Polytechnic Inst., Blacksburg) Mar. 1983 19 p refs Submitted for publication
(NASA-TM-84997; NAS 1.15:84997) Avail: NTIS HC A02/MF A01 CSCL 03B

Strong variable X-ray emission from the nearby low luminosity Seyfert 1 galaxy NGC 4051 was discovered during observations with the imaging proportional counter of the Einstein Observatory. During one 2304 second observation, the X-ray flux more than doubled in an approximately linear fashion, and a 70% increase for 150 seconds was seen during another 968 second observation. Evidence is presented which demonstrates that the X-ray spectrum of NGC 4051 is unusually soft compared to Seyfert 1 galaxies or QSOs. The emission mechanism is probably not synchrotron or synchrotron self-Compton, but the emission can be plausibly explained by various black hole accretion models.
Author

N83-23266*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMIC-RAY MODULATION AND THE ANAMALOUS COMPONENT
Frank C. Jones Mar. 1983 30 p refs Submitted for publication (NASA-TM-84994; Rept-665; NAS 1.15:84994) Avail: NTIS HC A03/MF A01 CSCL 03B

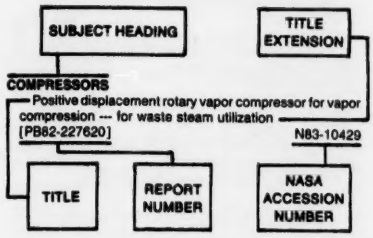
Advances in the theory and observation of cosmic ray modulation and in studies of the anomalous component in cosmic radiation are reviewed from reports that appeared in the open literature during the years 1979 to 1982. Entries, which are primarily the work of American researchers, are cited under the following categories: (1) microscopic diffusion theory; (2) global modulation theory; (3) anomalous component; and (4) general modulation observation.
A.R.H.

99 GENERAL

No abstracts in this category.

SUBJECT INDEX

Typical Subject Index Listing



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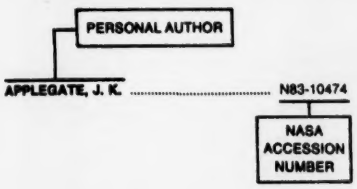

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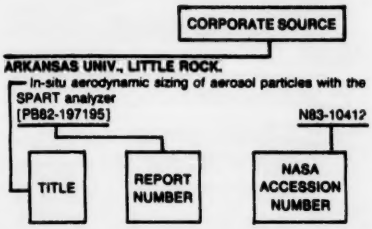

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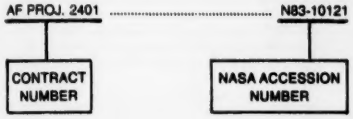

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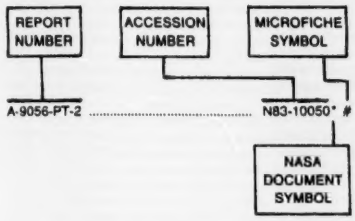

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CSIR-S-313-VOL-3 ..... N83-23221 #
CSIR-S-313-VOL-4 ..... N83-23227 #

CSIR-TSD-0001/82 ..... N83-22425 #
CSIR-TSD-0002/82 ..... N83-23236 #

DCQ/L-C-44.872-GB/CB ..... N83-22322 #

DEL-GT-1293 ..... N83-22492 #

DE82-005828 ..... N83-22802 #
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DE82-011986 ..... N83-22800 #
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DOE/BETC/RI-82/2 ..... N83-22335 #

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DOE/CS-20175/1 ..... N83-22353 #
DOE/CS-20291/3 ..... N83-22769 #
DOE/CS-20291/4 ..... N83-22811 #
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DOE/CS-24317/2 ..... N83-22482 #
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DOE/CS-50048/T1 ..... N83-22461 #
DOE/CS-50108/1 ..... N83-23245 #
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DOE/ER-01591/35 ..... N83-22635 #
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DOE/ER-04072/1 ..... N83-22399 #
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DOE/ER-05947/3 ..... N83-22436 #
DOE/ER-10350/2 ..... N83-23151 #
DOE/ER-10361/3-1 ..... N83-22889 #
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DOE/ER-12038/1 ..... N83-22639 #
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DOE/ER-13065/335 ..... N83-23133 #
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DOE/ET-29063/1 ..... N83-22536 #
DOE/ET-29354/3 ..... N83-22529 #
DOE/ET-37240/98TR-PT-1 ..... N83-22560 #
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DOE/TIC/EGC-82/3 ..... N83-22792 #

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